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# THE GLOBAL ENVIRONMENT MOVEMENT

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**A new hope for mankind**

**B.D. Nagchaudhuri  
S. Bhatt**

The environment movement brought about a common ecological approach to problem-solving world. Global issues are now in the light of the worldwide call for the protection of environment. A more creative life is expected through a better knowledge of man and his environment. Above all, all disciplines of natural sciences and social sciences are seeking integration with a view to understanding nature and its laws.

The book analyses India's environment policy issues, issues related to energy use, population, air and outer space laws, and Tagore's concept of unity in the diversity of laws of nature. It opens a new perspective for a global order of modern civilization based on the cooperative instinct of man as also of the natural order. It recommends a creative application of human laws in conformity with the laws of nature. This, the authors believe, will be the story of man in the 21st century.

"This book by Dr Nagchaudhuri and Dr Bhatt," says Professor D.S. Kothari, Chancellor of Jawaharlal Nehru University, New Delhi, "is a most welcome and valuable contribution to a supremely important subject. The subject is crucial to the very survival of mankind in the Atomic Age. An especially interesting and significant feature of the book is the attention given to pertinent Indian thought and philosophy. The message is clear: Without both Science and Ahimsa man has no future."

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## REVIEW

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New Year day, 1987

D. S. Kothari  
Chancellor,  
Jawaharlal Nehru University  
New Delhi

# The Global Environment Movement

## A New Hope For Mankind

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*and*

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L-10, Green Park Extension, New Delhi-110016  
24, Race Course Road, Bangalore-560001

S.O. No. 11, West Bengal

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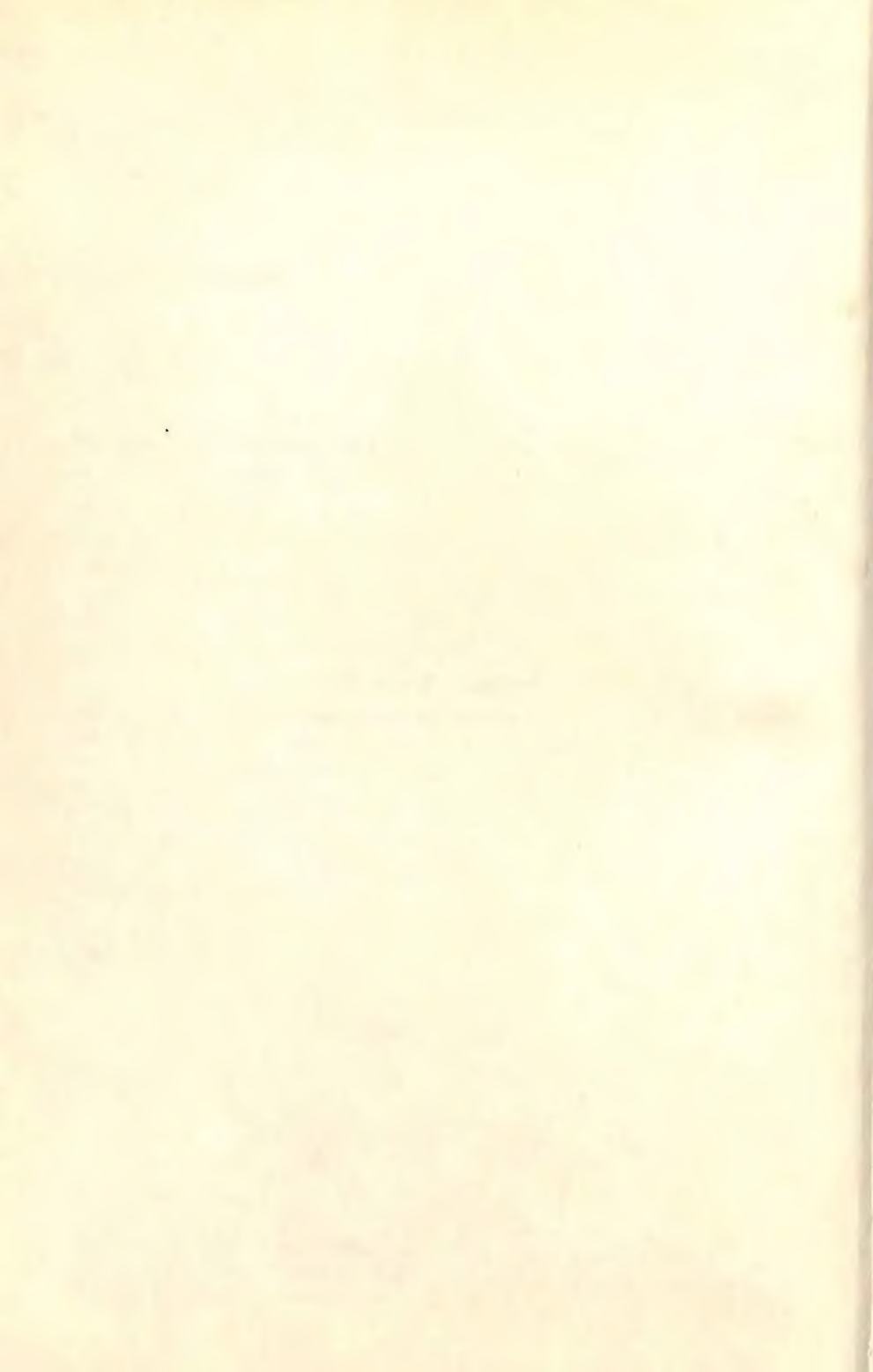
PRINTED IN INDIA

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Published by S.K. Ghai, Managing Director, Sterling Publishers (P) Ltd.,  
L-10, Green Park Extension, New Delhi-110016, Printed at Print India  
Mayapuri, New Delhi-110064.



*To*  
*Professor Satyan Bose*  
*Professor Jayalal Kaul*



## PREFACE

We are witness to a new enthusiasm in the history of our civilization. Today man has changed his attitude and relations with nature. Conservation and preservation of global environments are the major goals of societies in all parts of the globe.

In this book we have provided some reflections on the leading ideas in the current world environment movement. We have discussed some urgent issues relating to man's attitude to nature, energy-use, population control, policies in airspace and outer space, and the thrust for international co-operation in environment matters.

In a broadcast to the nation on 5 January 1985 the Prime Minister of India, Shri Rajiv Gandhi, made a reference to the people's movement to safeguard rivers, forests, and to use wasteland for afforestation. There is much ecological concern for the natural resources. Modern man's concern for the environment has therefore a new message for a new world order.

It is hoped that this book will be of general interest to scholars, scientists and the general public. Some chapters of this book have been published in some journals in India. However, these chapters have now been revised and updated wherever necessary.

1-1-1987

B.D. Nagchaudhuri  
S. Bhatt





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## INTRODUCTION : DAWN OF A NEW AGE

A NEW AGE seems to have dawned ever since the beginning of the 1970s. Within the last two and a half decades a new perception towards the global environment has developed. The study of environment is of common concern for all mankind. The 73rd Session of Indian Science Congress in New Delhi in 1986 was devoted to environment management. In the 74th Session of this Congress in 1987 at Bangalore, discussions were held on subjects of information centres for environments, ecology task forces for restoration of ecology-systems, and projects on atmospheric chemistry.<sup>1</sup> Science is studied with planetary dimensions. National sovereignties and environment concern form part of a global process, both interacting within a unified ecological order.

The world is witness to some new international movements. Conservation, population control, energy-use, maintenance of genetic diversity, international co-operation, and outer space exploration are phenomena of a new world order. Today the global society seems to strive for progress while keeping ecological balance with nature.

We have seen what an environment tragedy, such as the leakage of MIC gas in the Union Carbide plant in Bhopal, can mean for mankind. Nearly two thousand people died as a result of this accident and at one time 4 lakh people evacuated Bhopal to seek safer environments. The tragedy occurred during the night of 2-3 December 1984.

In the global environment movement of our times, new laws and policies are being pursued for preservation of nature. Forest policy, water policy, air and outer space policies, land-use

laws, and population control, are some areas in which new emphasis is laid to maintain ecological cleanliness and balance. The United Nations Environment Programme (UNEP) has among other issues accepted a proposal from India to include population control in environment planning.<sup>2</sup>

In India, a new forest policy has been evolved for protection of wild life and preservation of genetic diversity. Preservation of environment is the first policy objective while exploitation of forests is of secondary interest. The new emphasis is on involvement of tribals in forest management.<sup>3</sup>

Water management is one of the leading concerns of man. Addressing the Second World Congress on Water Resources, Shrimati Indira Gandhi, former Prime Minister of India, said that water resources were of importance "not for its own sake but for the use of those who inhabit the planet". Citing from Upanishads, she said: "Blessed be the effort, blessed strenuous effort, blessed be the collective endeavour, blessed individual endeavour, blessed be enterprise—this is what I wish for all those who are working for better management of water resources."<sup>4</sup> This underlines the need and importance of water resources management in the new planning of present world history.

Outer space exploration has meant a new vision and more knowledge for mankind. Earth resources satellites are being used for monitoring and planning of food and agriculture, health, medicine, land-use, soil conservation, monitoring forest fires and detection of sea-resources. Communication satellites help in education and communication purposes between world cities. Global climates are observed through weather satellites which are new aids for man in agriculture planning and in planning recreation in various geographical areas.

A management revolution is in the offing for management of the earth's resources aided by modern scientific techniques. Global environments have shrunk a great deal because of new technologies. Management futurologists have forecast a system's approach for future management techniques. The National Committee on Science and Technology (NCST) in India and its panel on futurology has identified management as an area for "intensive and analytical studies in terms of immediate future of 1985 and the likely future in the year 2000 A.D. in India."<sup>5</sup>

Planning processes have begun for controlling the resources



of river waters. Deserts are expected to be turned green in the new designs for environment planning. Agricultural experts dream of making Rajasthan green with new afforestation measures, although geologists provide a note of caution pointing out that changes in land-use in the arid areas may not produce any disturbance in the ecological balance. Meteorologists warn of changes in climatic conditions due to changes in land-use.<sup>6</sup> Indeed, the Government of India has set up a National Land Use and Wasteland Development Council under the Chairmanship of the Prime Minister with Chief Ministers and Union Ministers enrolled as members. It is proposed to turn 33 per cent of the land area into forests which today is just 11 per cent.<sup>7</sup>

Therefore the dawn of a new environment age has revealed new problems of ecology. Man has to learn the secrets of nature to be able to improve environments and adopt new economic and social conditions for man.

The United Nations has made a proposal for a World Charter for nature for which thirty countries have moved a resolution. The proposed Charter for nature says that mankind is dependent on natural systems for energy and that all civilizations are rooted in nature. Nature must be secured against degradation and governments must co-operate in the task of conserving nature, as stated in the draft for UN Charter on nature.<sup>8</sup>

Therefore, in the new environment age of our times man seeks unity and harmony with nature. Ecological planning is the goal of all societies in the world. New attempts are made to discover the mysteries of science and nature and integrate human progress by seeking cooperation with nature. Indeed the future course of our civilization may be determined by man's quest to understand more about the global environments.

#### NOTES AND REFERENCES

1. See proceedings of Indian Science Congress 1987 at Bangalore, India, *Statesman*, New Delhi, 5 January, 1987.
2. See "UNEP accepts India's Proposals on Environment", *Times of India*, 30 May, 1984.
3. See "Forest Policy to end Tribal's exploitation", *Times of India*, 30 April, 1984.

4. See Indira Gandhi, "World Teamwork Needed on Water Management", *Hindustan Times*, 13 December, 1975.
5. See "Changes in Management Pattern in 80's Forecast", *Hindustan Times*, 14 October, 1975.
6. See "Dangers of a Green Thar", *Hindustan Times*, 19 September, 1975.
7. See "Land Development body set-up", *Times of India*, 14 January, 1986.
8. See "Move for UN World Charter for Nature", *Times of India*, 24 October, 1982.

## 2

### **MAN OUT OF HARMONY WITH NATURE : SOME REFLECTIONS FROM INDIA ON THE GLOBAL ENVIRONMENT MOVEMENT**

**DURING** the last three decades or so, man's physical and biological environment (popularly called environment), in which is integrated his social, economic and cultural environment, is witnessing rapid changes. Lack of proper judgment in comprehending nature, and the large-scale use and misuse of technology has created worldwide environmental problems. There is, therefore, the need for mankind to identify the causes of the degradation of environment and to suggest responses and alternate courses of action in order to preserve the heritage of mankind and live in a wholesome environment.

We would briefly touch upon a few of the important problem areas here concerning man and environment which are a matter of concern to the global community, and briefly attempt to highlight the problems involved.

Environment scholars view with concern the accelerated technological development all over the world, particularly in the developed countries. They also observe the population rise with heightened concern, especially in the developing countries. These two aspects have lately presented mankind with the prospect of an alarmingly rapid transformation of the global landscape. Widespread application of science and technology for urban development has precipitated problems of pollution of airspace, water and land in many ecological systems of various parts of the earth. Man has, by the use of science and technology, touched the whole world which means that we need a comprehensive solution to the

problems of environment<sup>1</sup>. Many aspects of the heritage of mankind seem to be in danger, like some endangered biological species. In response to the impact on environment, a new global environment movement has been generated all over the world. The United Nations naturally spearheads this effort and has called attention to this problem in its Declaration of Stockholm in 1972. The essential theme of this Declaration is to keep harmony with nature.

In the search for harmony with nature, man is, in a way, in search of his soul. The inner and outer environment of man are in conflict as it were, as a result of changes in the physical environment. Hence, man finds himself at times not properly adjusted to the external physical environment.<sup>2</sup> Paradoxically, this conflict and lack of harmony between the external and the internal environment tends to create an unstable equilibrium. It is necessary therefore to restore the internal harmony of man with nature. This harmony is essential since any disharmony tends to create violence. As the UNESCO preamble says, wars start in the minds of men, so it is in the minds of men that we must build peaceful disposition.

In the search for spiritual harmony man finds many external impediments brought about by technological changes. Take, for example, the over-crowding of the habitat in our megalopolis. What man faces is the limitation of space. There is inadequate space to keep man in harmony with nature. As Rene Dubos says, even though we may be able to sustain a four-fold increase of current world population, we are going to run short of space. Moreover, the stress and strain of modern industrial life deprives an individual of his dignity and natural poise. Added to this is the recent effect on man of lack of pure air, water and of adulterated food. With these factors in view, man has to assess the role of technology in our society. Moreover, keeping international peace and order in view, and for the sake of happiness of man, we need to harmonise our actions in society so that we attain harmony with nature.<sup>3</sup>

We may perhaps, at the cost of repetition, state that the global environmental problem is not merely a problem of pollution. The over-emphasis on the material aspects of our civilization is perhaps the cause and pollution is the effect.<sup>4</sup> Moreover, without comprehension of nature's processes, and by excessive use of science and technology, including technology for armament, we are in conflict with the natural environment. We may, therefore, take more care



to understand the laws of nature and keep our actions in harmony with them. We may also otherwise find that the biosphere and the technosphere are not going to be in balance. Moreover, meeting global rising of human expectations may not be possible in the biological environment comprising of all living species. We may further examine whether purely technological expectations are sufficient to provide stability to our society and happiness to man.<sup>5</sup> It is being realised increasingly that perhaps they do not.<sup>6</sup> However, if we add an element of inner harmony,<sup>7</sup> we are likely to match technological expectations and attain more peace and stability. Elegant austerity by men, as pointed out by historian Arnold Toynbee, is a response by man to the spiritual control of technology.<sup>8</sup> UNESCO has called this approach "The Conservation of Human Nature".<sup>9</sup>

Therefore, we recommend that the global environment movement be seen in totality and a unified view about this terrestrial community be encouraged. A vision of totality towards a universal man has been expressed, for example, by Dr. Rabindranath Tagore of India.<sup>10</sup> It is at times contended that "too little is known about the totality which makes up our environment".<sup>11</sup> However, biologists, land management experts, specialists in air pollution, urban planners, etc. feel that changes are taking place rapidly.<sup>12</sup> It may further be possible to identify some major components of the physical global environment and compute changes that have occurred and are occurring at a scale which may even have an impact on the totality of our physical and biological environment. Some of the parameters are changes in world climatology, changes in ecological systems of selected areas in the world, and so on. Nevertheless, the aggregate effect of technological developments have changed our habitat landscape and has affected our life-styles and even genetic behaviour or culture patterns.<sup>13</sup>

Looking to the totality of our environment, we may not forget the verdict of investigations on past civilization.<sup>14</sup> Professor Arnold Toynbee, who made a systematic and extensive study on this subject, reminds us, that not external conquests but internal decay, has been the cause of decline of civilizations. History would therefore give us the right perspective in judging the direction of contemporary change. History would also deliver us not only from the undue influence of other times, but also from the influence of our own.<sup>15</sup> Excessive technological developments beyond a certain

stage seem to pose problems for the management of environment. This is the problem we seem to face while man harnesses natural resources at an accelerated rate. The problem is again due to the great appetite that modern man has shown for the use of technology in material growth. Economic growth at exponential rate has been the standard for modern progress. Belief in progress, however, means the progressive development of human potentialities.<sup>16</sup> We do not, however, feel we can give up economic development, and indeed, there is scope for skilful use of resources of technology for human advance. However, there has to be a sense of proportion between the supply and demand of resources on the one hand, and the impact of their use on environment, on the other hand.

We may therefore take a historical perspective on environment. The UN Declaration makes this point explicit when it says :

A point has been reached in history when we must shape our actions throughout the world with a more prudent care for their environmental consequences. Through ignorance or indifference we can do massive and irreversible harm to the earthly environment on which our life and well-being depend.<sup>17</sup>

Primitive man was materially poor, but he was by and large in harmony with nature, though of course, we may not recommend the return to the life-style of a primitive man, such a scheme not being feasible even if we would imagine so. Poverty, however, need not be associated with the lack of material goods only. We may also consider the poverty of mind which has created disharmony of man with nature in modern times. We may perhaps rationalise material poverty and recommend simpler life-styles which are ecologically sound.<sup>18</sup> Most sophisticated modern military technology, for example, is not perhaps in conformity with ecological requirements of man. Even the purpose behind such technology—of guaranteeing national security—is doubtful. It would appear that ecologically we are imposing an unnecessary burden on the global environment.

We look upon the global environment movement, therefore, as a kind of renaissance movement whose sole purpose is to cultivate scientific humanism which would help attain harmony with nature. This movement is directed towards attainment of

human ends of science and wholesome human environment. By that process, we believe, we can better attain the dignity and worth of man, as the UN Charter visualises. We therefore wish to highlight in the following paragraphs some of the issues involved in the current environmental problem so that it may strengthen global consciousness for attaining better harmony with nature.

The human environment is not an unlimited entity. This is important to understand if we mean to keep it wholesome. Though processes of nature maintain a balance of various forces, we should realise that environment can be a self-injurious system as every man uses it but no one necessarily repairs it. This is a basic issue which we cannot forget. The accelerated tempo of science and technology, combined with population rise and energy uses, can have a substantial impact on the global environment. Therefore there is need to understand that each state and each citizen of the world has environmental duties, as there are rights, to maintain a wholesome environment. Population rise is a serious matter in many parts of the world. We surely need a drastic reform in population control movement which, as Aldous Huxley<sup>19</sup> has aptly described, is necessary for making human freedom possible. Considering average human aspirations in terms of material goods, there may not be adequate resources to satisfy these aspirations for the rising population of the world.

Secondly, in relation to environment, we know that some changes are cumulative and some irreversible. Some environmental changes have occurred in history, though we do not know for certain, how. Therefore, there is a need to maintain a balance between the technosphere and the biosphere.

The depletion of the earth's resources is taking place at a pace which does not provide time for renewal of these resources in the natural cycle and moreover, there are some resources which are not inexhaustible. These are important considerations for the present and the future world economic order. The resources of seas are important for the world community. The present trend, however, seems to be to exploit them without much concern for the future of mankind. It is an important ecological matter to ensure how the resources of the seas can best be used for future requirements of the international community. As has been pointed out by Dr Pavithran, an eminent authority on the subject of world ecological order, "about 27 per cent of the world's

population was living in developed countries and enjoy 75 per cent of the world's wealth."<sup>20</sup> This explains the imbalance in the global economic system.

The traditional approach and purpose of national constitutional law and international law is not necessarily in keeping with the requirements of global environment. This aspect needs examination. International law, as Professor R.P. Anand says, is a living discipline.<sup>21</sup> International law must concern itself not only with the inanimate subject of states, but also with the entire biotic community. And most importantly, environmental law-making should have a future perspective. Past and present experience is of course needed and useful. Laws may be made to enable man to live in freedom from the tempo of technology and in harmony with nature. Environmental laws should be interpreted in the contextual process taking into consideration all relevant factors affecting the interests of global community. It follows also that all planning processes in national and international affairs should have an ecological perspective. Decision-making at all levels should conform to the requirements of wholesome human environment.

Without much involvement with the doctrinal details of international economic order, we suggest that traditional economic theories of growth rate be re-examined in the light of availability of global resources, population rise and changes in the environment. Economic theories should be ecologically sound providing adequate material environment for man so that man lives as a creative being. Emphasis should be on an adequate distribution system taking into consideration what various ecological systems produce. The whole economic system may not necessarily be competitive, though some amount of competition is necessary for skilful use of resources. With desired economic goals, competition can be helpful. Conservation as an ideal for international and national economic order seems logical.

We finally come to this conclusion that life styles need to be adjusted to seek more harmonious ecological goals. The stress on over-consumption and extensive use of natural resources in the developed countries needs to be examined in order to maintain not only the wholesome human environment, which gets degraded often, but as has been described earlier, in order to maintain inner harmony which is necessary to maintain harmony with



nature. As the poet Longfellow has said : "Glorious indeed is the world of God around us, but more glorious the world of God within us. There lies the land of song; there lies the poet's native land."

The developing countries need material goods for their people according to their ethos and culture and the resources available, so that adequate material advancement necessary for maintaining harmony with nature is made. In this the developing countries need not necessarily follow all the guidelines of the developed countries in economic life-styles. In fact we already witness a kind of synthesis taking place in the two kinds of life-styles of the East and the West which augurs well for the global community.<sup>22</sup>

What we may be expected to do is to make corrections for the excessive use of technology in the developed countries, and provide adequate material comfort to the people of the developing countries. This is a matter for international co-operation between nations of the world. We hope in the longer perspective of time, the present economic disparities will be reduced appreciably, ensuring a more stable global ecological order with brighter prospects of man living in harmony with nature.

#### NOTES AND REFERENCES

1. "Man has come in touch with the whole world and hence there is need to follow natural law," says Swami Vivekananda, the great seer from India. See *Complete Works of Vivekananda*, vol. II, p. 67.
2. "Many seemingly fully adaptive biological and social changes desirable today will have to be paid for in the future at a crucial price in terms of human values." See Rene Dubos, "Man and His Environment", in *Britannica Perspectives* (Chicago, 1968), vol. 1, p. 300.
3. Thus Dr. A.K. Pavithran, an eminent jurist from India writes : "The conspicuous contribution made by ancient Indian thinkers towards the development of law, both trans-national and national, consisted in the open acknowledgement of the universality of the law based on the bedrock of Dharma which advocated a life of love and renunciation." See "Problem of Power Conflict in International Relations", *Eastern Journal of International Law*, vol. 10, pp. 3-4.
4. On the nature of our industrial civilisation, see generally J.K. Galbraith, *New Industrial State* (London, 1967).
5. Science should be softened by spiritualism and spiritualism softened by

- science. See Vinobha Bhawe, cited by Dr. A.D. Pavithran, in n. 3, p. 3.
6. Consumer goods do not make a good life. See *Air Pollution and Social Sciences*, Paul B. Downing, ed. (New York, 1971).
  7. "The internal equilibrium is the basis and ground for higher illumination. . . ." See "Mystical Approach in the Upanishads", by Mahendra Nath Sarkar in *The Cultural Heritage of India* (Calcutta), vol. 1, p. 369.
  8. Arnold Toynbee, "Man and His Soul", *Hindustan Times* (New Delhi), 4 January, 1968.
  9. See Daniel Behrman, *In Partnership with Nature : UNESCO and the Environment* (Paris, 1973), Chapter VI.
  10. Dr. Tagore, a Nobel Laureate, was a great visionary from India. See P.K. Mukherji, *Life of Tagore*, Trans. by Sisir Kumar Ghosh (New Delhi, 1975), esp. p. 171.
  11. See n. 9, p. 89.
  12. *Ibid.*
  13. Rene Dubos points out the interdependence between biological and psychological evolution : "When human societies alter their environment through cultural change, they provide selective advantage for certain biological characteristics of human beings." See n. 2, p. 251.
  14. See in particular, Arnold J. Toynbee, *A Study of History : Reconsiderations* (London, 1961), vol. 12.
  15. Lord Acton, *Lectures on Modern History*, 1906, p. 33, cited in E.H. Carr, *What is History?* (London, 1961), p. 44.
  16. See Carr, *ibid.*, p. 119.
  17. See UN Doc. A/CONF. 48/14, 3 July 1972, Annex. II, pp. 2-6.
  18. See an excellent discussion in favour of new world economic order and small is beautiful by Dr. A.K. Pavithran. See, "World Futurology", in *Eastern Journal of International Law*, vol. 9, pp. 227-50. Dr. Pavithran has made a significant contribution to the emerging problems of environment and world order.
  19. Aldous Huxley, *Brave New World and Brave New World Revisited* (New York, 1965), p. 89.
  20. See Dr. A.K. Pavithran, n. 18, p. 242.
  21. R.P. Anand, *Legal Regime of Sea Bed and the Developing Countries* (Thomson Press India, 1975), p. 261.
  22. See for example, "Theory of Evolution : Sri Aurobindo and Teilhard De Chardin or A Meeting of East and West", by Sundaresan, *Eastern Journal of International Law*, vol. 10, pp. 43-51. It is most apt to cite here the pioneering efforts made by Dr. A.K. Pavithran, the founder of this Journal who had, for a decade, tried to create an international opinion and had helped evolution of ideas of the East and West.

## INTERNATIONAL CO-OPERATION FOR ECO- DEVELOPMENT : COMBINING THE ROLE OF INTERNATIONAL LAW AND GLOBAL SCIENCE IN CONTEMPORARY WORLD SOCIETY\*

### 1. The Need for International Co-operation in Science and Technology

THE UNITED Nations Conference for Science and Technology for Development met in 1979 to discuss its major theme : the impact of science and technology on the global society. The conference noted the advantages and the adverse effects of the application of modern technology. The idea of one world in economic and political terms has been a favourite theme of scholars ever since the end of the Second World War. In more recent years man is witnessing the large-scale impact of science and technology on the global landscape and the ecology of earth. Lately, the biologist's view is also gaining ground. According to modern biologists, man now lives ecologically in one world with other organisms with finite space and resources.<sup>1</sup>

The concept of economic development has to be viewed in overall perspective considering the dignity and worth of man, as visualised in the UN Charter. Development cannot ignore the interdependence of man with nature and the global environments.

It is therefore essential to think how international co-operation in science and technology can promote human dignity and

\*First published in *Journal of Scientific and Industrial Research*, issued by CSIR, vol. 42, no. 8, April 1983.

to promote the concept of all living things sharing in universal dignity. International co-operation would enable us to use science for removing global poverty and meet other human needs. Co-operation may be the most important use of science and technology in today's world society. Moreover, it is also important to understand that science promotes the unity of all life.

Science is knowledge. The purpose of knowledge, as stated by Bacon, is utility, to increase happiness and to mitigate suffering.<sup>2</sup> International co-operation means sharing of this knowledge and its use, to bring about alleviation of human suffering all over the world. The development of human society is connected in our minds with economic and social development but science and technology have a historic role to play beyond this.

At this point of human history, we may analyse the scope and extent of economic development in the world society. What are the problems faced by the developed countries as a result of ill thought out, abuses of technology? What are the problems being faced by the underdeveloped countries due to inadequate technological progress and inability to use it effectively. How much technology is needed for development? Can we identify technology that is in harmony with the global physical and biological environments? Can we combine knowledge of international law and science with human consideration for international co-operation in these vital aspects of eco-development for the entire global community. Can we promote an "equilibrium society" as is envisaged in the "Report of Club of Rome"?<sup>3</sup> Will such an "equilibrium society" conform to the requirement of law, humanity and science?

## **2. A General Principle of Law**

International law shapes relations between States. From the Treaty of Westphalia, states have evolved rules of law to govern inter-state relations. To this relationship have been added the rules of scientific co-operation and understanding mostly aided and evolved by the international scientific bodies. A universal practice among states often becomes accepted as a norm of international law. International co-operation in science and technology has also attained the status of a universal norm and is now recognised as a general principle of law. The normative characters of law and science are not opposed to each other. Both are



contextual and relate to better order and stability in international relations. Uniformity of nature is what Professor J.B.S. Haldane described as law.<sup>4</sup> So is international law : a uniformity of rules of conduct. Law would enable us to control the adverse impact of technology. It would help choose the kind of technological order we wish to establish and also help in better decision-making. As Professor Daniel Bell says : "The source of our predicament is not 'imperatives' of technology but a lack of decision mechanisms for choosing the kinds of technology and social support patterns we want."<sup>5</sup> Law would help promote international co-operation in this respect. And co-operation would surely enable man to progress through reason and rationalism.<sup>6</sup> "Science and technology", as pointed out by Seaborg, "can reveal a more rational course for planning our future and give us the means to provide for all men without plundering the planet."<sup>7</sup>

International co-operation in science and technology is not limited to economic interests alone. Science is a creative activity. Law is a creative activity too. Co-operation can be extended to the spiritual, biological and psychological aspects of scientific discovery. Indeed Kepler and others combined the mystical and the scientific modes of experience, each to illumine the other.<sup>8</sup> In recent times Einstein, Arnold Toynbee, and Mahatma Gandhi, among others, have advocated a combination of mystical and psychological power for spiritual control of technology. International co-operation in law and science can yield rich intellectual harvest for mankind by combining the wisdom of the entire world for development of this planet earth under conditions of ecological stability.<sup>9</sup> Modern philosophy of science has moved strangely towards mysticism and can be combined more easily and consistently with the mystical wisdom of the East to probe the unsolved problems of man and nature and the intimate relations between the two.

### 3. International Responsibility of States in a New Perspective

In traditional international law of nations, international responsibility is taken as the duty to repair the damage done by one state to another. In the interdependent world order of our times, responsibility is now understood in a more positive sense, that is, when nations not only avoid damage to each other, but co-operate for mutual good and progress. It would, therefore,



appear to be the responsibility of states to seek international co-operation for promoting science and technology for development. Though sovereign states have the right to exploit their resources, more common interests are involved where states need co-operation. We may refer briefly to activities in outer space, on the high seas, and global climate etc. Under Space Treaty of 1967, and other contracts arrived at by States, international consultation has been recognised as a general principle of international law, consultation and co-operation being complementary principles of law.

Economic development these days represents scientific progress as well. As Seaborg says : "We must be just as creative and innovative in our social, political, and economic thinking as we are in our planning and use of science and technology."<sup>10</sup> In development work, we are also concerned with raising the general standard of living, and removing poverty which means that development is a venture for mankind as a whole. It calls for the responsibility of all states to co-operate and free global society from want and tension so that it becomes stable. It would also be worth considering, as Professor Daniel Bell has proposed, whether the new technologies can provide us all the material benefits of technology and whether it is in the best interest of all people that the more materially advanced and resourceful countries also consider redistribution of some of their wealth to generate social and economic development of the lesser developed countries which need them most.<sup>11</sup> Mutual help and co-operation seem to be a historic responsibility of states and, therefore, responsibility of any state should be a positive commitment to create and restore an economic and social equilibrium in the international system. For this purpose, science and technology can be profitably harnessed through international co-operation.

#### **4. Development, Environment and Co-operation**

As economic and scientific development have an impact on global environments, greater necessity for international co-operation arises in order to protect environments, which is a primary and unfortunately a degradable resource base. Development, environment and co-operation are the three aspects of a triangle. Science and technology has imparted a quantum jump in the interaction of man and environments. To this is added the enormous

increase in the size of the world's population. Thus there is a change of scale and momentum of life on the one hand, and a tremendous impact on the global environment on other hand and it is therefore an important aspect of international co-operation to prevent an adverse impact on global environments. Other matters involving co-operation are : prevention of natural disasters, prevention of pollution of airspace, outer space, oceans, rivers, land and preservation of wild life and other aspects of heritage of mankind. A global conceptual framework has become necessary for social control of global technology. We would reach the limits of space at the present rate of development, especially in developed countries. Development should not, however, deprive men of privacy and space. These values may not be necessary for survival but are needs deeply rooted in human nature, as stated by Rene Dubos.<sup>12</sup> And human species is the same the world over and is subject to the impact of environment.

Therefore, it is imperative for decision-makers both in the developed and the developing countries to identify technological goals which do not alter the quality of global physical environment and also enable man to make material progress.

The culture of modern technology for defence seems to be an anachronism. It has no relation with the social and economic development of man. Nor does it help the security of nations. As world events have lately justified, the armament race is imposing a colossal burden upon the global system, multiplying global poverty and inflation. It often adversely affects environments such as in the case of supersonic flights, missiles at higher altitude, and discharge of chemical and other effluents as by-products etc.

There is an imperative need to seek a balance between our technosphere and our biosphere. A large part of this balance can be achieved by turning away from the technological goals which nations have set for defence preparedness. Military development has contributed its share to the exhaustion of global resources of materials and energy. Awareness of these factors would help raise consciousness of mankind towards new peace-oriented, resource-conserving technological goals of development.

## **5. Towards a New Global Ecological Order**

Ecology in a wider context is conceptually inseparable from

world public order and is significant in the context of economic development. Ecology is defined as the relationship of living organisms between themselves and their adaptations to the environment. It has more or less similar connotations as international law which defines relationship of states. Technology can be used to remove global poverty. Technology is useful so long as it does not increase greed, does not lead to exploitation of man, or of one country by another, and does not endanger human environment. Technology should free the human mind instead of enslaving it. Science and technology can enable man to discover the beauty and love of the universe. Science should be used to promote the dignity and worth of man. Man's dependence on nature today is matched by man's dependence on man. To realise human dignity becomes more urgent when man's dependence on society has increased tremendously. Many savants have noted this dependence, among others, Einstein. As he says: "The individual has become more conscious than ever of his dependence upon society. But he does not experience this dependence as a positive asset, as an organic tie, as a protective force, but rather a threat to his natural rights, or even to his economic existence."<sup>13</sup>

Technology should promote this organic tie of man to society rather than encourage conflict. And the true insight in this human endeavour would seem to lie in seeking rational harmony between development goals and the human spirit. As poet Rabindra Nath Tagore says: "In science we go through the discipline of eliminating the personal limitation of our individual minds and thus reach that comprehension of truth which is in the mind of the universal man."<sup>14</sup> It is this eternal vision of the universal man that mankind has to promote through science and technology. Development is only a means to it and not an end in itself. Development would vary in form and substance, related as it is to the individual ethos and culture of people. About two-thirds of the world is pre-industrial so far while some of the world is still pre-scientific in its perceptions. It is an important choice for this part of the world to avoid mistakes of the developed countries, at the same time increase its material wealth which is needed urgently by our poor people, who live tenuously in the borderline of survival. The new international economic order has to be need-based, it has to have a vision which all mankind can share, and for which international

co-operation is an important requirement.

Scientific co-operation between nations would also call for the freedom of information on matters relating to science and technology. Such information was at one time free and considered belonging to all men. Today while communication has improved, freedom of information has become increasingly restrictive. For moral, spiritual and scientific development of man, exchange of information is very important. Knowledge creates common values and common bonds between people. Science can only help in the systematic and uniform development of the people of the world. Therefore exchange of scientific information is an urgent need for the international community. Moreover, forces of nature are not only material, as Forbes has stated but are also trans-rational or spiritual. Co-operation leads to greater understanding of the forces of nature which we are investigating.<sup>15</sup>

In conclusion, we would stress that international co-operation in science and technology is urgent and imperative for modern international life. International law and science should promote co-operation which would lead to peace and harmony in the world. Co-operation is an overriding goal for economic development. Nations have the right to exploit their resources. They also have international responsibility to render mutual help and co-operation for economic development and a reasonable share of non-territorial resources. Science and technology should be seen as the means to the attainment of the spirit of a universal man. This realisation would lead to the attainment of the dignity and worth of man, as is movingly inscribed in the UN Charter. This ideal of science for the realisation of the spirit of a universal man is also practical. It is possible to progress towards this ideal if the international community dedicates itself to eco-development by a synthesis between international law and global science and with international co-operation.

#### NOTES AND REFERENCES

1. See generally, Bentley Glass, *Biology and Human Values*, p. 10.
2. See Daniel Bell, "Technology, Nature and Society", *American Scholar*, Summer 1973, pp. 8-9.
3. See *Report of Club of Rome*, New York, 1972, p. 84.



4. Cited in R. Calder, "Man and Cosmos", *Britannica Perspectives*, 1968, p. 63.
5. See Daniel Bell, in n. 2, p. 16.
6. See "Man to Mankind—The New Optimism", by Glenn T. Seaborg and William R. Corliss, in *Man And Atom*, p. 1971.
7. Gienfr T Seaborg, "Science, Technology, and Development : A New World Outlook", *USIS Service*, New Delhi, p. 2.
8. See n. 2, p. 5.
9. See generally R. Dubos, "Man and His Environment", in *Britannica Perspective*, vol. 1, 1968, p. 217.
10. See n. 7, p. 5.
11. See n. 2, p. 14.
12. Rene Dubos, "Recycling Social Man", *USIS*, p. 4.
13. See *My Views* by Albert Einstein, ed., and compiled by S.K. Bandopadhyaya (Calcutta, 1976), p. 28.
14. Tagore, *ibid.*, p. 53. Einstein and Tagore were discussing some aspects of life on 4 July 1930, at Einstein's residence at Kaputh.
15. See J. Forbes, "Conquest of Nature and its Consequences", *Britannica Perspectives*, vol. 1, 1968, p. 431.





## ENERGY, ENVIRONMENT AND WORLD ORDER

### 1. The Problem Stated

SELDOM has shortage of a single global resource affected global public order as the scarcity of oil. Shortage of energy is posing problems for the economic development of nations and for their international relations. In India some time ago, almost 70 per cent of foreign exchange earnings were spent on oil imports. Today India imports less than thirty per cent of her oil needs. In the developing countries, particularly in view of development needs, shortage of energy creates problems. The planning of New International Economic Order (NIEO) is, therefore, related to the equitable use of world's energy resources and replacement of oil by new development of technologies. Since the physical and biological environments are also subject to vast changes due to increasing use of energy, energy shortage has indeed a bearing on the life-style of our civilization.

It is proposed here to study briefly these aspects of the problem with a view to analysing them and suggesting a response to these global problems. At the outset we would like to take an optimistic view of the entire problem inasmuch as the energy problem is a challenge to mankind on the whole. We agree with Arnold Toynbee that though there is a response to a challenge, the response may not necessarily be in inventing new resources alone, but by adjusting our thinking and life-style so that we can change the course of history.<sup>1</sup> As Dr. S. Radhakrishnan, the former philosopher-President of India says: "There is no inevitability of history . . . We can swim against the current and even change its direction."<sup>2</sup>

Various factors are responsible for the energy problem facing mankind. First is the increase in demand of oil due to higher per capita use. Second, this demand is expanding exponentially with the increase in world population. Third, the resources of low-cost fuel are diminishing the world over.<sup>3</sup> Fourth, the increasing use of energy has an adverse impact on the physical and biological environment. Energy use in modern technological life and in industries releases vast amounts of pollutants which have an impact on the physical and biological functioning of life and on the ecological balance. The United Nations Declaration on Human Environment of 1972 cautions thus :

We see around us growing evidence of man-made harm in many regions of the earth : dangerous levels of pollution in water, air, earth and living beings; major and undesirable disturbances to the ecological balance of the biosphere; destruction and depletion of irreplaceable resources; and gross deficiencies harmful to the physical, mental and social health of men, in the man-made environment particularly in the living and working environment.<sup>4</sup>

Maintenance of a wholesome human environment has become an urgent problem for the international community.

For the purpose of maintaining ecological balance we may have to adopt new values of living for our civilization. These values would include less consumption of goods, less wastage and less per capita consumption of energy with minimal adverse effect on the global environment.

Some statistics would help us realise how modern man has embarked on increasing uses of energy. It is estimated that the current per capita use of energy in United States, for example, per day, is 250,000 calories. This represents over 100 times the energy use by man in the undeveloped societies.<sup>5</sup> This excessive use of energy by man disturbs the balance of nature. This lack of harmony with nature is aptly described by Professor Fowler as follows :

Primitive man lived at balance with nature. He was part of the great cycle of life, eating plants and the plant eaters, claiming only his small share of the energy released by photo-

synthesis, and returning it, day by day, as heat and waste. His per capita consumption was the 2000-3000 calories per day, which keeps the human body alive and active.<sup>6</sup>

Modern industrial civilization is being built on substantial increase in per capita use of energy. It is estimated that the world demand for energy doubles in about 15 years.<sup>7</sup> The total energy consumption of oil and natural gas in the non-socialist countries increased during the period 1950-1973 from 1,454 million tonnes of oil to 4,129 million tonnes. This represents a growth rate of 4.6 per cent per year which is somewhat identical with the world economic growth rate.<sup>8</sup> Use of electric energy is also increasing, rapidly doubling every 10 years in United States for example.<sup>9</sup> Coal consumption is estimated to increase 4 per cent annually the world over.<sup>10</sup> An interesting feature of this global energy crisis is the disparity in the per capita use of energy between the developed and the developing countries. Thirty three per cent of the world's affluent population, it has been estimated, consume nearly 82 per cent of the global energy.<sup>11</sup> The per capita consumption of coal per year in USA is 10 tonnes, in UK 7 tonnes, in Italy 1 tonne, in India 10 cwt, in Egypt 9 cwt.<sup>12</sup>

Man is therefore faced with a strange situation : an exponential increase in the demand of energy on the one hand and diminishing resources on the other hand. Whereas demand increases at about 4.6 per cent per year, the growth of 24 OECD countries averaged about 4.8 in 1960, which has fallen to 2 per cent since 1973.<sup>13</sup> The United Nations therefore called for an international conference on new and renewable sources of energy in 1981. This conference would discuss new techniques for identifying, assessing and exploring natural resources for energy use.<sup>14</sup> Obviously, the conference evolved a long-term strategy to face the energy crisis. At a largely attended UN meeting on energy held in 1979, the consensus has been to diversify the use of energy sources and plan for conservation.<sup>15</sup> The developed countries in particular need to slow down consumption in the long-term interest of global reserves. By reducing wastage of use of energy for armaments, which is estimated to be 450 billion<sup>16</sup> dollars per year, lesser developed countries can hope to get more energy for economic development.<sup>17</sup> The utilization of energy for armament and other non-peaceful uses is to be minimised in the

developed countries. The lesser developed countries need a "new vision of development" in which energy policies are based on self-reliance and are compatible with their culture and are in harmony with the natural environments.<sup>18</sup>

## 2. Energy and Economic Development

Energy has a significant relationship with economic development. Since energy is needed for economic growth, modern economists consider it the root of productivity.<sup>19</sup> However, economic growth apart, energy use reflects generally on the life-style of modern civilization, particularly in the developed countries in the West, that we have adopted.

Environmentalists however would like to make distinction between energy-use for development and the wholesale use of energy for a new life-style of Western civilization which is not in harmony with the nature's cycle. The point is made explicit by Lewis Mumford, a humanist philosopher and an analyst of the urban condition. He says :

... The main point to observe is that there is a deep-seated antagonism between a mechanistic, power-centred economy and the far older organic, life-centred economy; for a life economy seeks continuity, variety, orderly and purposeful growth. Such an economy is cut to the human measure and it respects the human scale, so that every organism, every community, every human being, shall have the variety of goods and experiences necessary for the fulfilment of his own individual life course, from birth to death.<sup>20</sup>

Therefore for a world perspective of energy's role for economic development, a balance is needed between the use of energy and the impact on environment and life-style in general. The UNESCO study describes this integrated approach as a unified analytical approach in which we study the interrelationship of population, resources, environment and development.<sup>21</sup>

Control of population in the world is an essential requirement for avoiding an adverse impact on the environment as a result of economic development. "Without population control India's energy problem cannot be solved," says Professor A.K. Saha the President of 67th Indian Science Congress. Planning of one per



cent growth rate of population by 1990-91 and 0.5 per cent after 2000-01 is needed for energy planning in the economic plan.<sup>22</sup> Control of population especially in the third world is important for global energy planning. Moreover, in ecological terms we have to consider the use of energy in relation to different habitats. Climatically colder countries need more energy to keep warm. For example, statistics reveal that 55 million square miles land in the world holds 90 per cent of global population leaving 10 per cent population in 42 million square miles which is arid and cold.<sup>23</sup> Ecology has therefore been described as an extension of economics, though traditional economics concerns with mere exchange of values, and does not include collective life.<sup>24</sup>

It is a matter of common observation, however, that for the next two decades or so we cannot think of oil as a cheap source of energy. Thereafter new pollution-free technologies will develop to replace oil. At this moment it seems that with the depletion of oil resources nature apparently has controlled the widespread use of energy by man which would harm environments. Hereafter, ecological considerations are unavoidable for economic development. In order to maintain, wholesome human environments, the advanced industrial nations need to develop their own resources of energy with less resort to manufacture and mass consumption of goods. Indeed Professor J.K. Galbraith in his widely circulated treatise warns :

I am led to the conclusion, which I trust others will find persuasive, that we are becoming the servants in thought, as in action, of the machine we have created to serve us. This is, in many ways, a comfortable servitude; some will look with wonder, and perhaps even indignation, on anyone who proposes escape . . . . I am concerned to suggest the general lines of emancipation. Otherwise we will allow economic goals to have an undue monopoly of our lives and at the expense of other and more valuable concerns. What counts is not the quality of our goods but the quality of life.<sup>25</sup>

The ecological constraints add a new dimension and necessitate revision of traditional economic policies by the developed countries. Similarly, the developing countries need energy resources to lift-off the poverty line. While doing so, the latter cannot avoid



an ethic of consumption and skilful uses of resources. "Built into such an ethic of consumption is also an ethic of production that is critical to the achievement of justice in society and balance and harmony in nature," says Rajni Kothari.<sup>26</sup>

To sum up, a long-term perspective of energy use and economic development would be best obtained as Professor Kenneth Boulding has described, by a stationary state "in which physical growth is no longer necessary and in which, therefore, human energies can be devoted to qualitative growth—knowledge, spirit, art and love."<sup>27</sup> With a great vision of history, Dr. Rabindranath Tagore, Nobel Laureate, considers values of joy, beauty and harmony necessary for a creative growth of the universal man and of our civilization.<sup>28</sup> Speaking about the laws of nature (from which economic development cannot be separated), Dr. Tagore says :

... We expected that the laws of nature should be held in abeyance for our convenience. But now we know better. We know that law cannot be set aside, and in this knowledge we have become strong. For this law is not something apart from us; it is our own.<sup>29</sup>

### 3. Energy and International Relations

In addition to the economic aspects involved in the sphere of international relations between States, energy relations are of very great importance as the energy cycle determines the overall biological functioning in the biosphere.<sup>30</sup> Professor Nicholas Polunin emphasis this aspect in a keynote paper :

As every biologist knows, the surface of the planet earth is bathed by day in solar energy which is fixed and utilized by green planets. Through their possession of chlorophyll, green plants have the particular and all-important ability of synthesizing complex organic substances from carbon dioxide and water with the aid of radiant energy from the sun, which energy is then stored in these organic substances and made available as the basis of the vital activity of practically all forms of life.<sup>31</sup>

Professor Polunin, while writing in the context of energy

relations and photosynthesis, rightly cautions that any interference with the natural cycle of energy—of supply of solar energy, the concentration of carbon dioxide, water content, functioning of chlorophyll, ray-filtering activity of stratosphere and the breakdown of organic substances needed to give energy for life and growth—might cause problems for normal functioning of life which can come to a standstill.<sup>32</sup>

Therefore while today the major focus of international relations between states is towards solving shortage of energy resources of oil, we may seize upon this opportunity provided by this global consciousness and plan and conduct relations which do not produce an adverse impact on the components of energy cycle and the environments. This unified approach to our biosphere presupposes a lot of international co-operation between States. And here we see a great role for international law which may be utilized for the management of environment and human affairs. We have to conceive of international law as the common law of biosphere, a common law of mankind of all living organisms, and not merely a law between States, and apply its tenets in ecological perspective—that is to say, the interrelationship of living organism is not to be tempered adversely. So we see here the similarity of natural law and international law. The basis of both the laws is of course co-operation and peaceful adjustment between the participants in the global power and social processes on the one hand and in the natural processes on the other hand. A harmonizing of international law with the laws of nature is an imperative requirement for promoting good life on earth. Similarly harmony of national and international interests is needed to promote ecological politics on the subject of which Professor Richard Falk of Princeton University has offered an eloquent treatise.<sup>33</sup> Arnold Toynbee also recommends strongly a harmony of national and universal politics and says “when Sir Ernest (Barker) goes on to say that the proper aim in politics is a harmony between ‘national’ and ‘universal’, I heartily agree with him.”<sup>34</sup> The non-alignment policy enunciated by late Prime Minister Jawaharlal Nehru was therefore a policy towards world harmony and was a quest for a warless world. Its ecological dimensions can be emulated a great deal for international relations needed to ensure a stable biosphere.

Co-operation promotes dignity of all features of the environment and it is for States to promote and apply this concept of

dignity to all components of the environment.<sup>35</sup> This would give a new dimension to international relations between States. For a stable biosphere, indeed this theme appears to be a commanding concept to be developed now on towards the 21st century. It may be useful to incorporate international consultation as a general principle of international law for any aspect involving interference with the natural process of the biosphere with an impact on the energy equilibrium.<sup>36</sup>

#### 4. Developing New Resources

Development of new resources of energy is a challenge for the entire international community. For a stable world order it is important to establish confidence and co-operation between States so that this challenge of modern civilization is faced adequately. Professor Hannes Alfen, a Noble Laureate in Physics (1970), who as the President of the Pugwash movement has rightly called for a world plan is of the view that technology and resources will satisfy energy requirements provided we stop the increase in population.<sup>37</sup> After all the larger issue before us is the development of man and of the undeveloped world. Some minimum quantity of energy is needed for economic growth in the developing part of the world and for avoiding pollution of global environment due to economic backwardness. The UN Declaration makes this point explicit. It says :

In the developing countries most of the environmental problems are caused by underdevelopment. Millions continue to live to far below the minimum levels required for a decent human existence, deprived of adequate food and clothing, shelter and education, health and sanitation. Therefore, the developing countries must direct their efforts to development, bearing in mind their priorities and the need to safeguard and improve the environment. For the same purpose, the industries should make efforts to reduce the gap between themselves and the developing countries. In the industrialised countries, environmental problems are generally related to industrialisation and technological development.<sup>38</sup>

Ward and Dubas also rightly point out in their report to the United Nations Conference at Stockholm : "Above all, how can

the worst of all 'pollutions', the daily grind of hopeless poverty on the fringe of farm and city, be countered by the growth of opportunity and work, of shelter, of health, of hope?"<sup>39</sup>

We have every hope that the present world energy crisis will yield new resources of energy which would be pollution-free and plentiful. At the same time, we do recognize that new energy policies are needed and are now, in fact, being followed towards new goals conservation,<sup>40</sup> economic life-styles, environmental protection, and in conformity with different ethos, culture and habitats.

Of the various alternative resources for oil, no single new source can command absolute priority. In fact there is merit in making use of different resources such as solar energy, hydrogen, nuclear energy, apart from fossil fuels. These resources are placed geographically apart and can meet local needs as has been the case in history. Indeed, history provides a unified view through archaeology and the genetics of use of energy and habitat. We can have different forms of energy-use according to habitat needs. Indeed this seems to follow from the organic evolution of man and societies.<sup>41</sup> In rural India, for example, 40 per cent of energy currently used is solar energy in varying forms. The present debate in the scientific and social institutions would favour an integrated approach to the energy problem. It is possible that a breakthrough in technology may make solar energy or energy from hydrogen available in large quantities which would counter the world's shortage of oil.

Energy use in India has to be adopted by an integrated approach to meet local requirements and for maintaining ecological balance. Most of the imported oil is used for transportation and heavy industries and for cooking purposes. Therefore traditional modes of transport not dependent upon oil should be revived. Other forms of energy such as electricity and wind mills should be used to avoid the drain on oil consumption. Rural electrification can save, it is estimated, Rs. 200 crores of kerosene.<sup>42</sup> The panel on futurology of the National Committee on Science and Technology has recommended reduction of "social travel". Other measures recommended by the panel are :

- (1) continued search for new sources of oil, gas and coal reserves;



- (2) research on non-conventional sources like solar, geo-thermal sources like solar, geo-thermal wind and of bio-gas energy;
- (3) research for synthetic sources;
- (4) conversion of industrial and thermo-electric fuel systems from oil to coal;
- (5) improvement in technique for higher fuel efficiency;
- (6) management innovations for operation of generation and distribution systems;
- (7) better maintenance of transport machinery to cut fuel; and
- (8) adoption of new life-style to reduce consumption.<sup>43</sup>

In the matter of life-style, human settlements and transport systems, it is observed that people in rural India move much less, consume less oil energy, depend upon solar energy for drying and other purposes, use bullock-carts and horses without consuming oil. These traditional methods should be intensified. In the matter of human settlements due regard is to be kept for energy sources available. Long systems of transportation should be adopted. A philosophy advocating less social travel should be adopted. In a country where there is approximately 2 per cent of land area and 14 per cent of population of the world, any approach leading to mass travel systems along railways, roads, and air routes is bound to result in congestion of these systems. And people in India are by nature not inclined to long distance travels. This policy to reduce mass travel should be very helpful in stabilizing transport systems in the country. Creation of fringe-towns to large cities would also need long distance travel which, if avoided, can save oil. Moreover, these monster-cities, as Arnold Toynbee has called them, create large management problems.<sup>44</sup> Small human settlements are ecologically very sound and healthy settlements. In these settlements cycles can provide a convenient means of transport for short distances. The bigger the cities the more mechanised the transport system with greater oil consumption and pollution problems. Therefore while planning for rural India adequate measures should be taken to establish self-sufficient settlements and to avoid dependence on large cities.

Therefore while planning on the global scale for energy use and habitat, a new kind of ecological thinking is needed for human



settlements, for transport system and for life-style in which large human settlements and mass transport systems are curtailed; in which people are not on the move always creating problems for the global environments. By adopting an integrated approach on energy use in harmony with habitats it is possible to avoid not only the drain on resources but also pollution of environment and increase of carbon dioxide in the biosphere. Increases of carbon dioxide is causing concern for long-term stability of global order and world climatology.<sup>45</sup> More carbon dioxide in atmosphere will increase temperature on earth which can even result in melting of ice-cap which would flood oceans. Disturbances of heat balance by increase of carbon dioxide will affect global weather adversely. A very keen debate is going on at this time on the results of the increase in carbon dioxide in global atmosphere. And fossil fuel particularly results in this increase.

## 5. Conclusions

In the analysis of our problem relating to energy, environment and world order, we are driven to the vision of a Spaceship Earth that is subject to some universal laws which keep the energy equilibrium in the biosphere. As Buckminster Fuller has described :

Spaceship Earth was so extraordinarily well-invented and designed that to our knowledge humans have been on board it for two million years not even knowing that they were on board a ship. . .so superbly designed as to be able to keep life regenerating on board despite the phenomenon, entropy, by which all local physical systems lose energy.<sup>46</sup>

Therefore we suggest that we take a global view of the energy problem which is based on ecological considerations. The concept of ecology would help us determine not only our international relations but would help adjustment of our policies on environments without significantly altering them. Based on ecological premises we suggest the following points in relation to the energy problem: First, we cultivate faith and vision that the energy problem is one like many that history has thrown upon us and this problem is capable of solution by adopting a calm and calculated posture. Second, we ought to devise a world plan which would provide for world-wide research on new technologies and which would meet the ecological requirements of the biosphere. Third,

the economically advanced countries should adopt a fraternal attitude to countries with lesser energy resources, after all, new technologies will be found and this period of history will be remembered more for international co-operation than for exploitation for economic gain. Fourth, whatever be the prospects for new technologies, the international community has to adopt conservation of oil resources as a new goal. This would involve a new turn to our life-style including reduced travel, less mass transportation, reduced production and consumption. Fifth, energy policies should be in harmony with local requirements. A habitat may be usefully served by wind mill, or solar energy, or hydroelectric power and so on. So with the transport systems which may be used according to local needs and geography. Sixth, in the planning of laws and legislation on energy and related subjects, we must strive to meet scientific requirements of the laws of nature. In this respect we should harmonise international law and natural law.

Environmental and ecological constraints have symbolised our thinking towards new goals, or goals which have been neglected under the influence of a culture of mass production and consumption. We recall here the vision of a Universal Man recommended by Dr Rabindranath Tagore with values of love, beauty, joy and harmony.<sup>47</sup> Professor Kenneth Boulding has also suggested after careful analysis of global economics that the international society should adopt these new harmonious goals so that we are able to see and appreciate new perspectives in slowing down economic growth in the industrial world, especially goals which involve large-scale use of energy for superfluous consumption and armament. We agree with Professor Boulding's analysis that there is an awakening towards these new goals for society which may command greater respect in the 21st century. Indeed, these new ideas are fast evolving in the international system.<sup>48</sup>

Above all, we stress that the energy problem be viewed as a collective responsibility of mankind. The solution we suggest depends upon taking an all inclusive approach as well as an individual approach suitable to each country. An all inclusive approach will help keep the global ecological balance and will also help the cause of international co-operation at a time when the world needs it most. The individuals approach would help better adjustments with the habitat eco-systems. Planning for human settlements,

transportation systems, and similar issues need a new orientation to suit a "unified analytical" view. Of course we need to balance various interests involved between economic development and environmental considerations.<sup>49</sup>

We also feel that in the choice for alternative resources, we cannot adopt a policy emphasising on a single source only. An integrated approach seems more appropriate and logical and would help utilize different energy resources available, depending upon various geographical regions. It would be a policy which may preserve our harmony with nature and the natural cycles as proved through history.

#### NOTES AND REFERENCES

1. From an analysis of history, Arnold Toynbee has depreciated the importance of matter and force over the course of human affairs. He says: "... I am not conceding that matter has the same power as spirit, or force the same power as love. ... I still maintain that spirit, and particularly the creative spiritual effect of suffering for the sake of love, is the distinctive and significant feature of human affairs." See Arnold J. Toynbee, *A Study of History: Reconsiderations* (London, 1961), vol. 12, p. 617. We believe that at this juncture of history we may not take a wholly mechanistic view of international relations affecting the energy problem. Who knows that this might be a forgotten chapter in the 21st century and may help chalk out a civilization in harmony with human spirit and nature? It could lead to a new international economic order with pollution-free solar energy, who knows? A day's sunshine over Delhi, it is speculated, can fuel India for years, says Barry Commoner. See *Hindustan Times*, 6 September, 1975.
2. Dr. S. Radhakrishnan, *Recovery of Faith* (Orient Paperback ed., 1967), p. 10.
3. According to an estimate of United Nations Industrial Development Organization (UNIDO) Director, Dr. Abdel Rahman Khane, the world's resources of oil would last for 20 years. See *Times of India*, 4 August 1979.
4. UN Doc A/CONF. 48/14, 3 July 1972, Annex II.
5. See John M. Fowler, *Energy and the Environment* (New York, 1975), p. 67. These estimates vary, however. See also R.J. Forbes, "The Conquest of Nature and its Consequences", *Britannica Perspectives*, 1968, vol. 1, p. 393.
6. Fowler, *ibid.*, p. 66.
7. See Jerry B. Marion, *Energy in Perspective* (London, 1974), p. 2.
8. See *Energy Policy: A consultative Document* presented to Parliament in United Kingdom in February 1978, Cm. 7101, London, p. 7.
9. See Andrew L. Simon, *Energy Resources* (New York, 1975), p. 5.

10. See Forbes, n. 1, p. 392.
11. Forbes, *ibid.*, p. 393.
12. *Ibid.*
13. See J.C. Sawhill, K. Oshima and H.W. Maull, *Energy Managing the Transition*, The Trilateral Commission Report, 1978, p. 5.
14. See *UN Chronicle*, July 1979, p. 53.
15. See *Times of India*, 28 November, 1979. A total of 700 experts from 100 countries met for a 2-week evaluation of about 50 ways of tackling the world energy crisis and reducing dependence on oil, including environmental impact. The general view has been that the problem of energy can be met by a combination of tactics, including search for new reserves, developing new technology and avoiding waste.
16. Figures provided by Justice S. Rangarajan in the Annual Conference of Indian Society of International Law in April 1980 on the subject of transfer of resources from rich to poor nations.
17. Some estimates have been made of the proven reserves of oil in the non-Communist world which is 555 billion barrels, with 80 per cent in OPEC countries for which Saudi Arabia, Kuwait, Qatar and UAR account for 58 per cent. See A. Vanaik, *Times of India*, 26 November, 1979.
18. See A.D. Herrera, "A New Role for Technology", in *Mazingira*, The World Forum for Environment and Development, no. 8, 1979, p. 37.
19. See in this context Barbara Ward and Rene Dubos, *Only One Earth: The Care and Maintenance of a Small Planet* (London, 1972), p. 44. This book was an unofficial report to UN Conference on human environment held in Stockholm in 1972. Ward has recently published another complementary book: *Progress for a Small Planet* where "the central thesis of the study can be best stated as follows: There are no limits to growth, at least not yet. But there are limits to waste, which are already very real. . .". See review by Sudhir Sen in *Times of India*, 2 March, 1980.
20. See Lewis Mumford, "The Future of Cities", in *Basic Issues in Environment*, Era J. Winn, ed. (Ohio, 1972), p. 207.
21. See "Ecology and Rational Use of Island Ecosystems", MAB Project 7, in *Nature and Resources*, Bulletin of Man and the Biosphere Programme, etc., vol. 15, no. 1, January-March, 1979, p. 25.
22. See *Times of India*, 6 February, 1980.
23. See Amos H. Hacooley, *Human Ecology* (New York, 1950), p. 94.
24. See *ibid.*, p. 72.
25. Professor John K. Galbraith, *New Industrial State* (London, 1967), pp. 7-8.
26. See *Mazingira*, no. 10, 1979, p. 11.
27. See Kenneth E. Boulding, "New Goals for Society?" in Sam H. Schurr, ed., *Energy, Economic Growth and the Environment*, papers presented at a Forum conducted by Resources for the Future, Inc., in Washington, D.C., 20-21 April, 1971, p. 151. Professor Boulding who was the Chairman, Board of Directors, American Association for Advancement of Science, considers these values to be symbolizing the achievement of maturity in the 21st century. See *ibid.*



28. See Dr. Rabindranath Tagore, *Sadhna* (first published by Macmillan Company in 1913, latest ed., Delhi, 1979), containing lectures delivered in Harvard University in 1913.
29. See *ibid.*, p. 50.
30. The term biosphere includes atmosphere (air), hydrosphere (water), and lithosphere (the crust of earth) where life is possible. It provides an integrated view of our planet.
31. Nicholas Polunin, "The Biosphere Today", in *The Environment Future*, Proceedings of the First International Conference on Environmental Future held in Finland from 27 June to 3 July, 1971, edited by Nicholas Polunin (London, 1972), p. 43.
32. Polunin, *ibid.*
33. Professor Richard A. Falk, *This Endangered Planet: Prospects and Proposals for Human Survival* (Vintage Books, New York, 1971), p. 495.
34. Arnold Toynbee, n. 1, p. 618.
35. Arnold Toynbee has called attention to this concept of dignity of environment. In reply to Daisaku Ikeda, Toynbee says: "I agree that the dignity of life is a universal, absolute standard. But we must not confine the term life to the life of the separate—or semi separate—living beings of whose we ourselves are specimens. The whole universe, and everything in it, is alive in the sense of having dignity." See *Choose Life: A Dialogue*, Richard L. Gage, ed., (London, 1976), p. 340.
36. Such a principle exists in the Space Treaty of 1967. A reference to this has been made by Thatcher in n. 31, p. 455.
37. See *Hindustan Times*, 18 February 1973.
38. See n. 3.
39. See Barbara Ward and Rene Dubas, n. 19, p. 243.
40. Conservation measures in USA for example have dropped energy use by 6 per cent between 1973-79, though this is not very significant. See K.C. Khanna in *Times of India*, 4 September 1979.
41. In this context see C.D. Darlington, *The Evolution of Man and Society* (London, 1969), esp. p. 679.
42. See n. 22. These figures are from a report of an official working group on energy policy.
43. See *Hindustan Times*, 2 October 1975.
44. See Arnold Toynbee, *Cities on the Move* (London, 1970).
45. See R. Calder, "Man and the Cosmos", *Britannica Perspectives*, 1968, p. 139. According to Calder, if all coal, oil and gas is used it will double carbon dioxide content of biosphere disturbing heat balance considerably by Greenhouse effect.
46. R. Buckminster Fuller, *Operating Manual for Spaceship Earth* (New York, 1969), cited in Fowler, n. 1, p. 25.
47. See Tagore, n. 28.
48. See, for example, remarks of Francisco R. Sagasti that :  

"More than 50 per cent of world investment in science and technology is directed towards the production of more sophisticated



weapons and armaments, and about two-thirds of the remainder towards marginally increased consumption of non-essentially goods."

See "Knowledge is power", *Mazingira*, no. 8, 1979, p. 28.

49. A useful study has been prepared by the Rockefeller Foundation. See *International Energy Supply: A Perspective from the Industrial World*, May 1978. See also *Energy Policy—A Consultative Document*, n. 8. For another useful report, see *Energy and the Environment*, Report of a Working Party set up jointly by the Committee for Environmental Conservation, Royal Society of Arts, and Institute of Fuel, prepared in 1973.



## THE IMPACT OF DEVELOPMENTS IN AIRSPACE AND OUTER SPACE ON GLOBAL ENVIRONMENTS

MAN's explorations in airspace and outer space have opened a new relationship between man and aerospace environments. Aerospace region provides man with new resources for economic development since scientific research of cosmic areas and other planets can be undertaken through this region. Outer space exploration has an indirect impact on global society. New space cities are proposed to be built in outer space and it is reported that work on the space city will commence to provide for settlement in two decades. It will have its own gardens, orchards, and will accommodate 10,000 people. An Indian scientist, Dr Rashmi Mayur who is also a futurologist, is among a group of scientists working on the project headed by Dr. O'Neill of Princeton University.<sup>1</sup>

Space shuttles have opened new vistas for man and aerospace transportation is likely to get revolutionised in the decades ahead. This half aircraft, half spacecraft, can be used for various types of experiments in outer space. Once again global environments are open to far reaching changes made by man.

The space age is therefore a new renaissance period in human history. It is the result of the driving curiosity which has inspired man in this age, according to Robert Oppenheimer.<sup>2</sup> He says science has become universal, and the scientific urge is based on an open mind and persuasion rather than authority.<sup>3</sup>

Arnold Toynbee makes an interesting historical observation. He says the West has set a pace for the entire world in science

and technology. This is producing changes in the environment and global society.<sup>4</sup> The history of our civilization is about 5000 years old, as Toynbee has surveyed. In the present era we are in a technology culture which has completely spread over global environments.

We may examine the current debate on star wars. This counter force strategy through air and outer space is designed to neutralise enemy missiles. It is reported that USA is developing "high speed battle management computers in outer space, space-based infra-red sensors for missile detection, laser pointing and tracking technology capable of making beam weapons accurate against targets a continent away. . . ."<sup>5</sup>

The question posed is how technology should be directed to save global cities, population and environments ?

Fortunately, we recall that space age and air age are the creations of men of vision and of science. As a writer points out candidly : "The men of science and technology open up brilliant new vistas while the men of politics and administration drag you back into the conventional world."<sup>6</sup>

The Space Age has produced many marvels for mankind. Space flights by cosmonauts for 175 days and 36 minutes in Salyut-6 spacecraft is a great epoch indeed.<sup>7</sup> The first space flight by Yuri Gagarin lasted for a few minutes only when compared with modern space flights of months. The United States is expected to set up a Lunar base by the year 2000.<sup>8</sup> These endeavours hold great promise for mankind in outer space environment and for voyages to other planets. Man is just testing the future at this stage.

Mankind has developed a creative regime of law and order in space environments. We have the space treaty, moon treaty, conventions on search and rescue of astronauts, liability, and a host of international and bilateral agreements which today determine the fabric of law and order in the aerospace region.

Space law has a very important role for global culture, war and peace. It operates for the benefit of mankind and determines goals for explorations in space and the duties and responsibilities of states in outer space environments. It ensures that outer space is not polluted. It provides above all, for global co-operation.

Global co operation through outer space has set another

trend for co-operation on earth as well. Co-operation leads to a new evolution of world society and is fast replacing notions of struggle for existence of man.

A new phase of human evolution has begun. National sovereignties are now reformed in the community of mankind. What was forecast in the dawn of the space age has come true today. For example, said Professor Taubenfeld in 1964 at the beginning of the space age: "If sufficiently low-cost service becomes feasible, a communication and transport revolution of more profound psychological, political and economic reverberations than the railway-steamship-telegraph revolution of the nineteenth century may be in the offing. . . . The present national-state system itself may be on the verge of technological and strategic obsolescence."<sup>9</sup>

In fact some describe the space age as the beginning of a new era of interaction of earth-space environments. The father of Skylab, Dr. Krafft Ehrlicke, for example, explains that "man is just at the beginning of his growth."<sup>10</sup> He says the ultimate goal of space exploration is "to broaden our resource base, to preserve Earth as a garden of the solar system".<sup>11</sup> Ehrlicke feels we can save earth from pollution by exploring other planets and the moon.

And Ehrlicke may be right. After all, we are building space stations to be used as cosmodrums for launching manned interplanetary craft on round trips to Mars etc.<sup>12</sup> Indeed we are just short of international collaboration in these giant steps. USA and USSR, the two space powers, have to some extent collaborated in their docking missions on 19 July, 1975. Apollo astronauts and Soyuz cosmonauts exchanged on that day visits between their orbital homes in outer space.<sup>13</sup>

Looking down on earth we see space programmes being utilized for communication, education, entertainment, remote-sensing of global resources, environment monitoring etc.

At this point we need to describe the somewhat restricted regime of airspace where nations are trying to get over the habits of the past. Some interaction is likely between the free regime of outer space and the strict national regime of airspace.

Nevertheless, in airspace, air transport has produced great leaps for world progress. It is necessary to measure the impact of aviation on cities of the world and on global ecology. Modern

airports are centres of economic activities. Aviation provides communication and international routes for interaction while airports produce global economies. Airport noise and pollution by aircraft cause degradation of environments. New laws are being developed to control aviation technology.

Aerospace activities have, therefore, produced a momentum for global environments and a new phase has been ushered in the history of our civilization. How to safeguard global environments while using this region is the major concern of all nations. These ventures in air and outer space are no doubt a product of human ingenuity and scientific quest of man. Man has to balance curiosity and goals of technologies with the ecological requirements of natural environments. John Maddox, the editor of *Nature*, referred to progress as an idea which is of recent origin. The Greeks and Romans were concerned with the present. Plato in his Republic said that the objective of his work was to educate the community and understand justice.<sup>14</sup>

It is possible that man is trying to educate himself about the cosmos and will learn to see in future the justification for his actions.

#### NOTES AND REFERENCES

1. See "First Space City to be ready in 23 Years", *Times of India*, 16 June 1980.
2. J. Robert Oppenheimer, *The Open Mind* (New York, 1955).
3. *Ibid.*, p. 115.
4. Arnold Toynbee, *A Study of History : Reconsiderations*, vol. 12, p. 51.
5. See "Star Wars Weapons. . .", in *Times of India*, 29 November, 1983.
6. See C.P. Ramachandran, "Space Age", *Hindustan Times*, 13 April, 1981.
7. See *Times of India*, 3 October, 1980.
8. See statement of Col. James B. Irwin, "Apollo 15 Astronaut", in *Times of India*, 17 February, 1985.
9. Howard J. Taubenfeld and Rita Taubenfeld, eds., *Space and Society : Studies for Seminar on Problems of Outer Space* (New York, 1964), p. 3.
10. See Krafft Ehrlicke, "Space Garden", *Span*, Special section on space travel, April, 1975.
11. *Ibid.*
12. See *Newsweek*, 13 November, 1978.
13. See "Space Heroes Exchange Visits", *The Statesman*, 19 July, 1975.
14. John Maddox lecture on 'What is progress? What is future?', Relayed through All India Radio on 2 January, 1984.



# 6

## POPULATION, ENVIRONMENT AND WORLD ORDER

### 1. Nature of Problem : Impact of Population Increase on Environment

THE POPULATION of the developing nations is growing rapidly at varying rates between 1.5 per cent to nearly 3 per cent per year.<sup>1</sup> The population of India doubled itself in thirty years between 1951 and 1981 and will exceed 10 crores at the end of the century.<sup>2</sup> The developed world on the other hand showed much slower growth rates and in some cases, a stable situation has emerged. The technological progress has been even more phenomenal and has kept pace so far with the needs of food, and clothing of the people in the developing world. However, the technological progress and the distribution of its benefits have been lop-sided benefiting the rich more than the poor. Technology also has produced a new set of problems concerning environmental stresses due to industrial effluents, emissions, noise, distortions of land form and psychological disturbances. Intensive agriculture has also added to problems of environmental degradation in the form of excess fertilizers and pesticides in the soil, food and drainage into water bodies which means that more people face more environmental problems than ever before.

Population has a two-fold impact on a society. Primarily it is a pressure on resources of land, water, energy and mineral resources, these pressures being in proportion to the population of an area. There is an aggravating condition that more demands are made on these resources than the simple proportionality, as people, very naturally, wish to have a better life, more amenities and more energy at their disposal, more movement, labour saving

devices and entertainment. These increasing demands have not yet shown any saturation or limits and consequently the environmental stresses tend to increase somewhat more rapidly than the population increases. There are ameliorating factors as knowledge and modern technology tend to provide better management, less polluting or energy-consuming technologies. There are however serious disturbing factors as human populations seriously reduce the living space of animals and plants leading to critical ecological situations. These effects are often threshold effects which come into play in a dramatic, even drastic way beyond a certain limit of pressures of the ecological system. There are other possible effects on human populations themselves. It is known in some mammalian species that beyond a certain limit of overcrowding, these populations exhibit stresses such as fighting amongst themselves and sometimes group self-destruction. In studies of human populations, overcrowding stresses, such as increase in crime, mob violence and social tensions have also been noted. It is enough to note that population increases beyond certain limits can cause psychological disturbances in human populations. That is, beyond pressures on resources and stresses on the environment, there are also psychological tensions related to the high density of populations.

## **2. Promises of Solutions : Role of New Technologies**

It is important to enquire whether there is promise of solutions to these problems with the growth of knowledge and technology. Technological achievements have led to the use of new materials. For example, titanium has substituted aluminium and its alloys in many aircraft and other special structures. Its high cost today has limited its more common use. Tungsten, molybdenum, nickel and other refractory metals have increasing uses as also glasses and ceramics. The main or common metals and alloys such as those of iron, copper, aluminium, chromium and nickel have been and will continue to be extensively used. The mining of the bulk ores and processing of the ores to the final metal or alloy needs substantial amounts of energy. Moreover, the changes in the land forms, leading into waters and agricultural lands produce environmental stresses which can only be corrected with wise management and expenditure of energy needed for treatment and transport.

In principle, technological fixes are known or can be found out to reduce the environmental degradation caused by use of technology in varying degrees by all industries and most agricultural activities. On the one side, growing population leads to greater industrial and agricultural activities. On the other hand, growing populations lead to greater need of land for these needed activities. In fact land or space is needed for biotic systems to recover from the degradation caused by land-use. The better managed an activity the less the environmental deterioration, the more the intense the activity higher the deterioration; the greater the biotic space available the quicker and easier for land to recover from the effects of environmental degradation.

There are, however, two limiting rules which need to be kept in view. The first is the critical or threshold effect of degradation on an environment or eco-system. If the degradation exceeds the resiliency thresholds, an eco-system, an environment, can go beyond a recoverable stage. For example, one or more species of plants or animals can be so decimated that it becomes extinct. If the role of such plants or animals was crucial in an ecological system as food, predator, or equilibrating agent, its absence also can disrupt such an eco-system. Such effects can happen in nature through accidents. However, human intervention has increased the probability of such occurrences manifold. Human interventions have tended to increase with multiplying human populations due to unforeseen effects of technology, such as acid rain and increase in global atmospheric carbon dioxide.

The increasing use of coal and oil as energy sources, the release of non-degradable or very slowly degradable wastes from modern industry and some of its products such as plastics and stainless alloys, have the potential of substantial global accumulation and movement, carried by air and ocean currents. Modern technology and the scale of industry thus have created a situation entirely new in human history, where the effects of human activity in one part of the world can affect other distant parts of the globe. The nature and scale of such effects are dramatically increased as increasing populations of the countries want more of the goods and services rendered accessible by modern technology. Modern technology, in many instances have also devised procedures and processes which can alleviate some of these effects. However, there are several caveats on this statement. There are

many wastes and pollutants to which such technological fixes do not yet apply. Scientists and technologists are working on some of these problems and by the very nature of such problems, there will perhaps be solutions in the future. The costs of alleviation are sometimes substantial and many industries and nations are unwilling to invest in such remedial action as they increase costs of products. The affected population is either distant or in the future and the motivation for such increased expenditures and costs therefore tend to be low. For example, the slow increase in global carbon dioxide affects global climate only in the long run, say around a hundred years. Acid rains affect neighbouring nations or even sometimes distant nations. Pollutants dumped in a river can be carried downstream to affect the water supply and aquatic life of nations downstream. Even pollutants dumped in the coastal waters intentionally or by accidents, as in the release of large quantities of petroleum in a tanker accident, can be carried by tides and currents to the shores of neighbouring nations. Radioactive wastes are a ubiquitous hazard.

### **3. Atmosphere and Oceans are one World-wide Receptacle**

Thus a consequence of modern technology is that the environmental hazards created involve nations who are neither producers nor beneficiaries of the specific technology. Some of the consequences of these technologies are global in character simply because the atmosphere and the oceans are a single world-wide receptacle of many of the undesirable products of human activity. The amounts of discharge of these undesirable products are proportional to the intensity or size of the industries and the number of people who use the products. The number of people using PVC packages may well be closely related to the number of people in the user country rather than the population of the producer nation which packages and markets them. Since pollution spills over beyond boundaries of nations, since the amounts of such undesirable products are mostly related to technology and population, environmental problems have an international aspect of some consequence. The international nature of environmental problems is now recognized fully. The United Nations held the first global conference on environment in 1972 as a result of this global awareness.

Sweden has suffered from acid rain due to the industries in



Germany. Oil spills by tankers have affected the biota of the Malacca Straits between Malaysia and Indonesia, and in a more dramatic manner, accidents such as Torrey Canyon polluted the coasts of France and the United Kingdom.

#### 4. Environment is Global in Character

The one important consequence of technology and modern science is the recognition that the environment is global in character. If one nation does something that degrades or seriously disturbs the environment, many other nations are likely to be affected, and, in some instances, disturbed possibly seriously, if such interference is of a magnitude beyond the resilience of the environment to correct itself in a reasonable time. A distinguished British biologist, Lovelock, coined the word Gaia to denote the global environment as a single entity. While this common awareness is fairly well realized by scientists, it is, unfortunately, not greatly appreciated or even understood by the political leadership of the nations of the world. This is of some serious concern to the common people of the world. Political and technological ambitions have led to a serious arms race which is not confined to the two big powers only. Even the production and testing of these armaments have no small effects. The missile and aircraft exhausts in the stratosphere and above cause dissociation and formation of new molecules which produce effects in the rarefied medium that can be observed.<sup>3</sup>

Wars have a much larger effect and can disrupt the ionosphere substantially. A war with nuclear weapons by the large powers can be totally destructive to all living beings not excluding human beings. It can destroy the atmosphere, the earth and the oceans beyond the resiliency of the global system. Such a prospect is within the realms of possibility. It can only be kept out of bounds by the good sense, the responsible actions of nations. The environmental destruction in Vietnam over twenty years ago has not yet been completely repaired. And yet much greater destruction over much vaster areas is possible if the nations and particularly the powerful nations of the world, do not exercise restraint. Such possibilities increase as the number of nations increase, and the contiguous pairs of nations multiply.



### 5. Population Increase Produces Global Tensions

Increasing populations and pressures on resources have increased tensions between nations. Wars that are purposely designed to destroy the environment of a nation is now increasingly possible. This may be likened to old time sieges to starve a population to surrender, since the destruction of the environment will aim to deny food, contaminate water and poison the air. In the many localised conflicts that have taken in the last thirty-eight years, the only one that was aimed to deny the environment, or rather to destroy it so that the will to fight is lost did not succeed for a variety of reasons, particularly that of the big power strategic balance that acted as a restraining influence. In case such restraints disappear, the local wars can be environmentally disastrous to a small nation with all its eco-systems, under attack. Although the United Nations have often reiterated outlawing of environmental war or rather, wars on the environment, a satisfactory methodology to prevent or stop such wars has not been evolved. However, the role of the UN is undeniable in stopping or preventing such wars.

The more desirable situation would be the prevention of tensions that lead to war or a conflict which no doubt affects the environment. As the UN Declaration of 1972 rightly emphasises : "The protection and improvement of the human environment is a major issue which affects the well-being of peoples and economic development throughout the world, it is the urgent desire of the people of the whole world and the duty of all governments."

There are many elements which tend to build up tension. High populations and attractive resources are the push and the pull that can lead to estrangement and potential conflicts. Unhappily, if there are no conflict resolution mechanisms, such incipient tensions can escalate to subvert or obvert acts of war such as surreptitious poisoning of reservoirs of water or destruction of water courses. Finally, it would escalate to war as conflict resolution become increasingly difficult because nations persistently act unilaterally in their supposed self-interest to the detriment of the interest of other nations.

### 6. Population has Optimum Limit for Maintaining a Wholesome Human Environment

Sociologists have observed that human endemity increases

with a man interacting with neighbours only up to a point. Stresses which tend to increase in the interaction between neighbours is due to the rapid increase in the number of neighbours. Thus endemity maximises at a certain population density and decreases on both sides of a graph. In animals, such as rats, mice and lemmings, it has been observed that excessive overcrowding increases conflicts and violence as well as withdrawal symptoms.

It is not possible to make analogous studies, but sociologists have tried to find the reasons for the higher incidence of crime in slums and congested urban human settlements. These have been sometimes attributed to overcrowding, lack of privacy, poverty and unhealthy living conditions. The point is that population densities and social environment are interrelated. The human environment in its totality improves to an optimum with population, thereafter there is degradation which can be decreased or minimised through human endeavour and application of knowledge. An optimal environment or a truly endemonic environment will also tend to reduce not only internal tensions, but tensions with neighbouring nations. We see in a small way the external relationships and internal environment interrelations between the Scandinavian nations of Norway, Sweden, Denmark and Finland. Whether such conditions can be extrapolated to the South Asian nations would be an interesting total concept connecting the environment, the internal and neighbour nation relationships and populations of a region and it is worth making such a study for a better world order between nations.

Finally, whether such ideas can be expanded to the entire globe and the UN as the messenger of the concepts, will be an exciting prospect to work for. Peace and some prosperity is inseparable for preservation of the environment, and to reduce the possibilities of conflict. A population living in harmony with its natural support systems will no doubt avoid conflicts and wars between nations. Indeed, Charles Darwin's theory of human evolution was merely an extension of the idea of human kinship and kinship with living organisms all over the world. The realisation of this kinship has become more important in the present phase of human history.

## NOTES AND REFERENCES

1. Following statistics are provided in US Census Bureau (see *Hindustan Times*, 11 July, 1980): Population growth in Africa increased from 2.5 per cent during 1965-70 to 2.9 per cent during 1975-79. Overall global rate dropped from 2.1 per cent in 1965-70 to 1.7 per cent over 1975-79. Growth rate in Europe was lowest, 0.6 per cent during 1975-79 compared to 0.8 per cent in 1965-80. Similarly, in North America the rate had dropped during 1975-79 to 0.8 per cent compared to 1.1 per cent, in South America 2.4 per cent compared to 2.7 per cent, and in Asia it was 1.9 per cent compared to 2.5 per cent in earlier period of 1965-70.
2. Population of India doubled to 68 crores in 34 years since Independence, 1981 census has revealed. On 1 March, 1981, it was 68 crores compared to 54 crores in 1971. The addition of 12 crores during this period represents 24.75 per cent growth in the last decade compared to 24.80 per cent in 1961-71 period. By 2001 A.D. estimated population is 950 millions. Birth rate has dropped from 46 per 1000 in 1971 to 36 in 1981, and death rate fallen from 15.7 per thousand 10 years ago to 14.8 in 1981. Life expectancy has increased from 46 years in 1971 to 54 years in 1981. These figures were given by Registrar General of India. See *Times of India*, 19 March, 1981.
3. For an interesting study of depletion of Ozone problem due to man's activities in aerospace region, see Report of Carl Q. Christol, prepared for US Senate entitled "The International Legal and Institutional Aspects of the Stratosphere Ozone Problem", 1975, p. 132.

## REFLECTIONS ON THE ENVIRONMENT POLICY OF INDIA

### 1. Introduction

ENVIRONMENT policy is a subject of keen social, political and scientific interest in contemporary times. The impact of technology on global environment has created awareness for keeping a clean environment and ensuring harmony with nature. Environment policy therefore calls for integrated approach from various academic disciplines to shape man's attitude and actions regarding environment. It involves study of the laws of nature. It seeks a relationship between national laws and international laws. In our reflections therefore, it is proposed to study the broad contours of India's policy in relation to environment.

In discussions of environment policy, India has a rich heritage to draw upon. It is interesting to synthesise the views contained in classical wisdom and ancient scriptures like the Upanishads with modern scientific observations on the phenomenon of nature.

Environment is the sum of social, biological, physical and chemical factors which comprise the surroundings of man. In the larger context, it includes the totality of the cosmos of which the planet earth is a part. Our major concern in environment is however with the biosphere which supports life on earth.

Environment, according to the UN Declaration on Environment made in 1972, gives man "physical sustenance and affords him the opportunity for intellectual, moral, social and spiritual growth."<sup>1</sup> The Declaration outlines the following goals towards environment: to attain "freedom in the world of nature"; to use

"knowledge to build in collaboration with nature a better environment"; and to "defend and improve the human environment for present and future generations. . . together with, and in harmony with the established and fundamental goals of peace and of worldwide economic and social development."<sup>2</sup>

## 2. The Causes of Environmental Deterioration

Lack of discipline is the primary cause of the degradation of environment. Exploitation has characterised the attitude and actions of modern man towards environment. In older days, as poet Tagore says, man's disposition towards environment "was not to acquire but to realize, to enlarge his consciousness by growing with and growing into his surroundings".<sup>3</sup> In modern times, economic exploitation of environment and dumping of wastes in it has brought us into conflict with the laws of nature. Interference with the natural system has led to deterioration and instability of our environments. In the West, the degradation of environment is due to stresses of over-development. In India, as in many other underdeveloped countries, the problem of environment is due to poverty and consequent inadequate care of environment. Added to this is the tremendous impact on environment because of rise in population. Population creates greater demands on environments and results in unplanned growth of towns and cities with adverse impact on all aspects of natural environments. Not to regulate the growth of population and human settlements would appear to be an extreme lack of discipline by man. It seems we do not treat our environment with greater love. Rene Dubos and Barbara Ward point out with great sentiments: ". . . Is this not a precious home for all of us earthlings? Is it not worth our love? Does it not deserve all the inventiveness and courage and generosity of which we are capable to preserve it from degradation and destruction and, by doing so, to secure our own survival?"<sup>4</sup>

It would appear that with greater demand on our environments we need to develop an attitude towards environments which would provide moral, spiritual and physical growth, and not mere economic growth. What we need the most is an ecological thinking on all aspects of our national life. Rapid changes in environment within the life-time of two or three generations have created an imperative need for man to develop an ecological understanding. As Rene Dubos points out, "While Homo sapiens has remained



essentially the same from the genetic point of view, the manifestations of his life and the structure of his societies are endlessly changing."<sup>5</sup>

Therefore the environment problem in India is a part of contemporary history and concerns evolution of man and society. Evolution, as stated by Julian Huxley, has entered a psycho-social phase which is based on accumulation of knowledge and organization of experience.<sup>6</sup> "Evolution in this phase", he says, "is mainly cultural, not genetic; it is no longer focused solely on survival but is increasingly directed towards fulfilment and towards quality of achievement."<sup>7</sup>

The question is how far and to what extent shall we permit changes in environment? What kind of evolution of our civilization will result with these environment changes? These questions are as important for a debate in India as elsewhere in the world.

Environment policy in India would take an integrative view of changes in environment and overall psycho-social development of man. An action-oriented scientific response is needed to stop deterioration of environment. It is often possible to improve environments without unduly disturbing the ecological balance. For this purpose, manmade laws should be carefully analysed so that there is no conflict with nature's laws.

Fortunately there is a world-wide environment consciousness to safeguard global environments. The presence of 133 nations in the UN Conference on environment in 1972 shows the concern of mankind for the deterioration of global environment. Because of this consciousness, the world is fast moving towards international co-operation in solving environmental problems. There is common concern between sovereign nations who realise interdependence between the biosphere and technosphere. A new set of human values are emerging out of such awareness. The concept of the unity of environment or the biogeosphere was propounded by such concepts as Gaia, proposed by Lovelock, and partnership between nations with wider loyalties. Environment is now being viewed as a unified whole with nations as parts thereof.

### 3. A Unified View of Global Environments

To have a framework for environmental policy, it is essential to understand the unity and diversity of laws which govern nature's processes as well as human and social constraints. The essence of

relationship between various components of environment, that is, between laws of nature and laws of society is their interdependence and, under the best of circumstances, their unity. In that sense environment is a continuous global entity which needs a unified view for observation and analysis. There are diverse characteristics of environment in various geographical and ecological situations. For this purpose the environment policy has to be diversified to meet local ecological requirements. Thus while we view environment policy in an unified analytical angle, we also see the parts in the whole. This conception of environment policy is necessary, if we wish to understand the relationship of nature's processes, to achieve goals of environment policy and ecological balance.

Leading thinkers of our time such as Einstein in the West and Tagore in India have expressed the unified view of nature's process and its close linkages with social processes.

Lecturing at Harvard University in 1913 Tagore said that there is unbreakable continuity in physical laws of nature. Tagore said:

This principle of unity is the mystery of all mysteries. The existence of a duality at once raises a question in our minds, and we seek its solution in the One. When at last we find a relation between these two, and thereby see them as one in essence, we feel that we have come to the truth.<sup>8</sup>

Tagore does refer to a feeling of mystery which is needed to grasp the unity in nature's laws. He says:

Curiously enough there are men who lose that feeling of mystery, which is at the root of all our delights, when they discover the uniformity of law among the diversity of nature. As if gravitation is not more of a mystery than the fall of an apple, as if evolution from one scale of being to the other is not something which is even more shy of explanation than a succession of creation.<sup>9</sup>

A similar unified view of the world's relationship with nature's process is given by Einstein. He says that "The theoretical physicists' picture of the world... is one among all the possible pictures. It demands vigorous precision in the description of

relationships.”<sup>10</sup> From the unified view, Einstein sees the relationship of laws of nature. He says:

Once such a valid world image has been achieved, it turns out to apply after all to every natural phenomenon, including all its complexity, and in its completeness. From the general law on which the structure of theoretical physics rests, it should be possible to attain by pure deduction the description, that is to say, the theory of every natural process, including those of life if such a process of deduction were not far beyond the capacity of human thinking.<sup>11</sup>

The Indian environment is a part of and not separate from the global environment. Any national environmental policy is thus unavoidably linked with the international policies and global situations. The environment policy of India should be constructed or enunciated to take into account a unified view of the global environment since our environmental issues have a global content also. At the same time, the policy should meet requirements of the diversity of geographical areas and ecological regions, keeping harmony, rhythm and equilibrium with the whole gamut of environmental situations in the country. To discover the relationship of laws of nature in various ecological phenomena is important. For example, an increase of carbon dioxide by the burning of fossil fuel has an impact on the heat balance of the earth which affects global climatology, life-style and economic development. It also affects India—as it does other countries. The probabilities are that tropical countries like India are affected more adversely than the temperate countries, and perhaps coastal areas more than upland areas.

Mankind is faced with many common issues connected with the evolution and progress of man. In a fast changing global environment and with the rapid progress of science some basic questions of life on this planet are at stake. A unified view is necessary to arrive at knowledge which may be useful for all.

Is evolution of man as Darwin puts it, due to random selection in nature, or is it based on the succession of creations to which Tagore makes a reference? God does not play with dice says Einstein, while referring to the explanation of nature's laws and physical processes. He is of the opinion that there is an

unperceived order in nature hidden in the apparent disorder governed by as yet undiscovered laws.<sup>12</sup> Environmental sciences may lead to discovery of Reality and laws of nature. Einstein stresses the thematic approach in science philosophy and says: "In a certain sense, therefore, I hold it true that pure thought can grasp reality, as the ancient dreamed."<sup>13</sup>

We see Einstein looking for a universal formal principle to explain the Reality of nature. In similar vein we may argue whether evolution can be a dice game suggested by Darwin or is it based on successive creation from one scale of being to the other and is a purposeful creation of God?

However, we can conveniently say at this stage that evolution is a matter of history. Our concern in environmental policy is with the course of history. For this reason the UN Declaration states that "a point has been reached in history when we must shape our actions throughout the world with a more prudent care for their environmental consequences." Our concern is with the evolutionary progress in history. Evolutionary progress, as Julian Huxley describes appropriately, is a quest for truth, knowledge, virtue, beauty, aesthetic expression, and its satisfaction through channels of science and philosophy, mysticism, morality, literature and arts.<sup>14</sup>

#### **4. Environment Policy in India in the Past**

What kind of environment policy has India had in the past? The predominant attitude of man in past history has been to preserve harmony with the natural order. Laws of Manu, Dharma Shastra and Upanishads reflect this desire for harmony. In ancient India, writes poet Tagore, the forest and natural life gave a particular direction to man's living. Man was "in constant contact with the living growth of nature." He enlarged his consciousness by growing with his surroundings. He realised the "harmony between man's spirit and the spirit of the world", he says.<sup>15</sup> Indeed this harmony between the spirit of man and that of nature promoted peaceful and better kind of adaptation to environment. The psycho-social adaptation from which stems the nature of man was of greater significance than biological adaptation. As Rene Dubos explains: "In the final analysis not physical fitness to environmental conditions, nor comfort of body, nor even survival of the human species, suffice to encompass the richness of man's nature.



Herein lies inadequacy of the purely biological view of adaptation."<sup>16</sup> Swami Vivekananda, a thinker and seer of India, makes a reference to the spiritual content of psycho-social adaptation which is a richer form than other forms of adaptations. He says: "The lower types of humanity in all nations find pleasure in the resources while the cultured and the educated find it in thought, in philosophy, in arts and sciences. Spirituality is a still higher plane."<sup>17</sup>

In ancient India man was concerned with the totality of existence.<sup>18</sup> To attain the goal of freedom and happiness, life was seen in unity with the eternal.<sup>19</sup> In the modern context, Professor Richard Falk of Princeton University proposes that "the creation of a new system of world order must draw its animating vision from the long and widespread affirmation that all men are part of a single human family."<sup>20</sup> Professor Falk makes a strong plea for emulating values of people in ancient India in relation to environment. To understand the unity of life of people in contemporary civilization is the major theme of global environment policy.

Harmony with nature has been the predominant trait in the history of medieval India and in Mughal times. The remarkable development of art and architecture in the history of Mughal period reflects harmony with nature. "It was a happy mingling of Muslim and Hindu art, traditions and elements," say some noted historians.<sup>21</sup>

### **5. Some Major Factors Affecting Contemporary Environment Policy in India**

Population, human settlement, transportation, energy, resources and development are some important parameters that have bearing directly and indirectly on environment policy of India. Indeed these parameters have a common interrelationship and influence overall policy.

Increase or decrease in population has a resultant impact on human settlement which has further impact on energy-use and transportation systems needed for resources exploitation and economic development. It is like a cycle in nature and we have to take a comprehensive view to maintain ecological balance.

More human population means more living organisms, including their food, which further means more of living organisms of plants and animals. It has been estimated that earth can support



more than 30 billion people at almost starvation level of subsistence.<sup>22</sup> What then will be the impact of increase of randomness on environments and even on world climatology? For such reasons the World Meteorological Organisation (WMO) has advocated harmony between society and nature for long-term survival of mankind.<sup>23</sup>

We also must note the direct and indirect impact of population on environment because of environmental stresses due to pollution of air, water and degradation of land areas. We cannot ignore the visual pollution of nature also and of cities and towns in India.<sup>24a</sup> Indeed Bertrand Russell remarked elsewhere that having visited places after an interval of some years he found a great deal of visual pollution and loss of the beauty of nature.<sup>24</sup>

As we know, in India population doubles in nearly 25 to 30 years. The environmental stresses would thus also double if the population used per capita food and resources at the same level. However the demands on nature more than double as energy and resource uses per capita increase also. For maintaining better environment, control of population thus is an immediate national task. It would be easier to develop greater harmony between man and nature if technology leaves more natural surroundings intact to absorb the impact of human activities.

The people of India have happily a great sense of partnership with nature. This instinct for harmony is important for formulating environment policy of India. It may be fruitfully utilized in planning human settlements, transportation and energy requirements. Improvement in village settlements will keep better harmony with nature than planning urban settlements in look-alike colonies. Transportation systems should include short-run systems used in villages in India, including bullock-carts and horses, as that would also avoid dependence on oil.

About thirty years ago, people in India travelled less and kept themselves in specific geographical areas, which was ecologically sound. It is worthwhile to remind ourselves that when people travelled less and spent more time in their immediate environment they often improved and loved them more. Rene Dubos, a leading biologist and one who is also quite concerned with the problem of global ecology and human settlements, says that while visiting places, "I remember the mood of places better than their precise features, because places evoke for me life situations rather than

geographical sites.”<sup>25</sup> Indeed sometimes the disharmony of man with environments in modern times can be traced to too much movement and lack of an intimate relationship with a certain geographical area. Relationship of population to habitat has been called a question of balance.<sup>26</sup> Less population, less movement of people, and less technology for resource exploitation, would maintain this balance of nature better. Therefore economic development and population are seen more scientifically in ecological terms as indeed ecology has been described as an extension of economics.<sup>27</sup> An ecological interpretation of economics is sustainable in terms of the laws of nature. These natural laws do not depend merely on concepts of exchange value or growth rate. In India particularly, an ecological outlook on economics and development is as opportune as it is scientific. Such an outlook can be in accord with human expectations.

The Report of Club of Rome for the year 2000 states that we may have 7 billion people in the world by then, and if we strive for per capita GNP as high as in USA the load alone on environment will be ten times its present value.<sup>28</sup> Such a level of environmental stress according to current indications may not be sustainable. This leads the Club of Rome to suggest there have to be limits to economic growth. A need-based economy is needed in India with a good distribution system as that would keep balance with nature. Skilful uses of resources, recycling, conservation of resources, and a philosophy of living which is part of our ethos and ancient culture, should enable us formulate an environment policy which ensures harmony and happiness. Population control is however the most important imperative of present and future policy on environment.

## **6. Environmental Laws and Design for an Environmental Policy Act**

Environment being an interrelated subject as we have seen, laws are needed to safeguard and protect natural environments. The Constitution of India provides for environment rights and duties. It also has provisions to make legislation on environmental subjects. The Central, State, and concurrent list of subjects on which legislation is made by the Parliament or State Legislatures, have many subjects which would attract environmental concern. Some of these subjects in the State list are: noise control, land

improvement, irrigation, town planning, slum clearance, housing schemes, pest control, smoke control, water pollution, forests, wildlife, recreation etc. Already there are laws in many States on these subjects.

Many subjects of common interests of States and of national interests have Central enactments, as for example, in the case of the Pesticide Act of 1968, Wild Life Act of 1972, Water Pollution Control Act of 1974 and the Air (Prevention of Pollution and Control) Act of 1981. Other subjects of environmental interest in the Central list of subjects are: regulation of industries in public interest, safety in mines, inter-state rivers, fishing etc. Population control also calls for state and central enactments.

To be able to provide for an enactment of a general nature which would ensure maintenance of wholesome human environments and which would provide for general policy objectives needed to safeguard and improve environments, an Environmental Policy Act is needed as has been drafted in 1986.<sup>29</sup> This Act provided for maintaining harmony with nature while making plans for social and economic development. This Act would ensure that environment impact assessment is made of planning activities, especially those which tend to change the ecological balance in areas concerning irrigation, power, dam-building, minning, water reservoirs, desertification, forest conservation, conservation of exhaustible resources, heritage of mankind, heavy industries, etc. The Act would provide for improvement of environment. It would above all provide for the pursuit of knowledge about environment with the background of the heritage of India, which as Tagore says, makes for realisation and not merely the economic exploitation of environment.<sup>30</sup> It would provide for the pursuit of the cultural heritage of India which in the words of Dr. Radhakrishnan is "a living tradition (which) influences our inner faculties, harmonizes our nature and lifts us to a higher level".<sup>31</sup> It would also provide for international co-operation in environmental matters. It may be of some interest that the Environmental Policy Act of 1969 in USA, for example, has set out the following as its purposes: To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the

ecological systems and natural resources important to the nation, and to establish a Council on Environmental Quality.<sup>32</sup>

## 7. Conclusions

In conclusion we submit that environmental policy should be formulated with a unified integrated view. The relationship of various natural processes should be taken care of for improvement and maintenance of a wholesome human environment. A sound environment policy for India would be based on unity of global and national life, and in conformity with our cultural heritage. Harmony with nature is the cornerstone of this policy since we cannot exploit nature to the detriment or depletion of nature's resources on which our life-support system critically depends. To understand the economics of eco-systems is therefore necessary. Gandhiji may be more relevant today except that the scales are different. Instead of the use of foreign cloth which Gandhi objected to, it may be more relevant today to explore the impact of oil for which national planning is needed to reduce consumption. This is possible once we take a total view of a society living in ecological balance with its environment and plan our human settlements, transport communication and trade according to our ethos and energy reserves. Movements of people for unproductive purposes would yield greater amount of energy for industries. Lesser consumption of goods which can often mean goods that last will involve less load of wastage and pollution of environments. The life-style of the 19th century may offer some values which can be adopted from now on while we enter the 21st century.

Science policy should look to selective application of technology. It should increase knowledge and enlightenment of man. It should help environment policy to provide a new vision of life in towns, villages and cities. Cities should provide some attribute of village life and villages should adopt some attractions of cities to reduce urbanization of the national land-space. Population control is to be taken on a national scale. Expansion of population is a great burden on the carrying capacity of our environments. Modern technology and population rise make great demands on space and on environments.

Laws and institutions have to take note of the major tenets of our policy—of freedom, knowledge, development and harmony. The Environmental Policy Act (1986) should endeavour to promote



the above goal of environment policy.

Goethe has rightly said that "we must earn again for ourselves what we have inherited."<sup>33</sup> It becomes therefore a duty for all to maintain the nature's ecological balance and preserve environmental heritage of mankind while we seek progress of man and society in partnership with nature.

## NOTES AND REFERENCES

1. See UN Doc. A/Conf. 48/14, 3 July, 1972, Annex II, pp. 2-6.
2. *Ibid.*
3. See Rabindranath Tagore, *Sadhana, The Realisation of Life*, lectures delivered in Harvard University in 1913, first published by McMillan Company of India in 1913, 1979 ed., p. 4.
4. See Barbara Ward and Rene Dubos, *Only One Earth: The Care and Maintenance of a Small Planet*. Report to UN Conference on Human Environment, Stockholm 1972 (London, 1972), pp. 298-9.
5. See Rene Dubos, "Man and His Environment", *Britannica Perspectives*, vol. 1, 1968, p. 262.
6. Julian Huxley, cited in *ibid.*, p. 250.
7. *Ibid.*
8. See Tagore, n. 3, p. 80.
9. *Ibid.*, p. 81.
10. See Gerald Holton, *Thematic Origins of Scientific Thought: Kepler to Einstein* (Cambridge, Mass.: Harvard University Press, 1973), p. 377.
11. *Ibid.*
12. See Arthur Koestler, *The Act of Creation* (London, 1964), p. 241.
13. See Einstein in Holton, n. 10, p. 234.
14. See Julian Huxley, *On Living in a Revolution* (New York, 1944), p. 66.
15. Tagore, n. 3, p. 4.
16. Rene Dubos, n. 4, p. 301.
17. See *The Complete Works of Swami Vivekananda* (Calcutta, 1968), vol. II, p. 66.
18. See, for example, *The Mind of J. Krishnamurti*, ed. by Luis S.R. Vas (Bombay, 1971), esp. p. 52.
19. *Ibid.*, p. 83.
20. Richard A. Falk, *This Endangered Planet: Prospects and Proposals for Human Survival* (New York, 1972), p. 296.
21. See generally R.C. Majumdar, H.C. Raychaudhuri and Kalikinkar Datta, *An Advanced History of India* (Madras, 1977), p. 577.
22. See Professor H. Palmstierna, *Future Imperatives for the Human Environment*, May 1972, a publication of UN Center for Social and Economic Information, p. 11.
23. See *Outline Plan and Basis for the World Climate Programme, 1980-1983*



- (WHO, No. 540, Geneva, 1980), p. 64. WHO has warned to preserve the fertility of soils, avoid misuse of water resources, forests and range lands, to arrest desertification and lessen pollution of atmosphere and oceans.
- 24a. Some recent steps to preserve Indian environment include setting up of land development body, and clean-up of Ganga project under the Prime Minister. See *Times of India*, 14 March, 1984.
  24. Cited in Paul Shepard and Daniel Mckinley, ed., *The Subversive Science : Essays Towards an Ecology of Man* (Boston, 1969), p. 369.
  25. Rene Dubos, *A God Within* (New York, 1972), p. 87.
  26. See Amos H. Hawley, *Human Ecology* (New York, 1950), p. 149.
  27. See *ibid.*, p. 72.
  28. See *The Limits to Growth*, A Report for the Club of Rome (New York, 1972), p. 84.
  29. See *The Environment Protection Act 1986*.  
This Act provides for following : Coordination of action of State Governments, planning and execution of nation-wide programmes for protection of environments, laying down standards of quality of environment, restriction of areas for operation of industries, prevention of accidents, handling of hazardous substances, research and investigations, collection and dissemination of information etc.
  30. See Tagore, n. 3, p. 4.
  31. See Dr. Radhakrishnan, *The Hindu View of Life* (Bombay, 1976), p. 15.
  32. See *Environmental Law Review* (New York, 1971), pp. 194-5.
  33. Goethe, cited in Era J. Winn, ed., *Basic Issues in Environment* (Ohio, 1972), p. 241.

## 8

### FUTURE PERSPECTIVES

WE HAVE reflected upon some trends which determine the present environment movement. Conservation and protection of environment are major issues before the world society. There are many positive ideas in the international system which provide hope for a better world order. A world-wide awareness combined with new environment policies has produced optimism for the future.

Nature works through two opposites, says Tagore. "It indeed seems to be wonderful that nature has these two aspects at one and at the same time, and so antithetical—one being of thralldom and the other of freedom," says Tagore.<sup>1</sup> Man's action through technology should be balanced with nature's resilience and it is this whole truth that we call ecology in modern parlance.

How to deal with the dualism of nature? Tagore answers: "Through our sense of truth we realise law in creation, and through our sense of beauty we realize harmony in the universe."<sup>2</sup>

Modern man is realising how to rediscover the beauty and harmony of nature. By this discovery global violence and the armament race can be reduced if not eliminated altogether.

With this sense of beauty an optimistic view can be seen for the future of mankind. We may refer to some uninspiring forecasts made by the World Future Society. The Society says that plant species are vanishing at the rate of 10,000 a year. Soil erosion and population boom are likely to pose problems for world society. The Society has some good news as well for future. It says that world will use technology for accident prevention. Man will set a base at Moon in the year 2007, etc.<sup>3</sup>

We do not wish to forecast the future, nor is it possible to do so. However, we may draw attention to the widespread concern of

man to ensure the future of global environments. This environment movement calls for a new understanding of nature and its cycles. The global land areas, waters, climates, and other components of environment are interrelated and interdependent.<sup>4</sup>

Therefore more international cooperation is needed in the future between nations of the world.

Secondly, we need to educate ourselves that mankind is a single species as Bertrand Russell among others has pointed out.<sup>5</sup>

Thirdly, to protect global environments, we now have a world conservation movement. Long ago Aldous Huxley in his *Brave New World* warned: "...who is going to educate the human race in the principles and practices of conservation".<sup>6</sup> And this concept has at last caught up with us. Conservation is the subtle art of use of laws of nature and natural resources. It means scientific use of recycling of resources.

To ensure the future stability of world order, environmental rights and duties have to be defined once again. Environmental rights would ensure human dignity along with dignity of all life on this planet. Human laws must therefore reflect mutual dependence and interrelationship of all beings.

#### NOTES AND REFERENCES

1. Rabindranath Tagore, *Sadhana*, 1979, p. 85.
2. *Ibid.*, p. 120.
3. See "Disturbing Forecasts on World Future", *Times of India*, 27 December, 1984.
4. Two leading Russian scientists have for example, stated that world's water resources are a single entity. See Charles H. Southwick, *Ecology and the Quality of our Environment* (London, 1972), p. 276.
5. Bertrand Russell, *New Hopes for a Changing World* (London, 1975), p. 21.
6. Aldous Huxley, *Brave New World and Brave New World Revisited* (New York, 1965), p. 92. First published in 1932.

## SELECT BIBLIOGRAPHY

- Anand, R.P., *Legal Regime of Sea Bed and the Developing Countries*, 1975.
- Bhatt, S., *Environment Protection and International Law*, Radiant Publication, Kalkaji, New Delhi, 1985, pp. 122.
- , *Environmental Laws and Water Resources Management*, Radiant Publication, India, and Advent Books Inc. New York, 1986, pp. 355.
- Behrman, Danial, *In Partnership with Nature—UNESCO and the Environment* (Paris, 1973).
- Bell, Daniel, "Technology, Nature and Society", *American Scholar*, Summer 1973.
- Bentley, Glass, "Biology and Human Values", USIS, New Delhi.
- Book of Nature: The Way Things Work*, published by George Allen and Unwin Ltd., 1981, pp. 525.
- Boulding, Kenneth E., "New Goals for Society", S.H. Schun, ed., *Energy, Economic Growth and the Environment*.
- Carr, E.H., *What is History*, 1961.
- Darlington, C.D., *The Evolution of Man and Society* (London, 1961).
- Downing, Paul B., ed., *Air Pollution and Social Sciences* (New York, 1971).
- "Drive to adopt national water policy", *Times of India*, 22 July, 1983.
- Dubos, Rene, "Man and his Environment", *Britannica Perspectives*, vol. 1, 1968.
- Einstein, A., *My Views*, ed. by S.K. Bandopadhyaya (Calcutta, 1976).
- "Environment Research Programme", prepared by NCEPC, Department of Science and Technology, New Delhi.
- Forbes, R.J., "The Conquest of Nature and its Consequences", *Britannica Perspectives*, vol. 1, 1968.
- Fowler, John M., *Energy and Environment* (New York, 1975).

- Fuller, Buckminster R., *Operating Manual for Spaceship Earth* (New York, 1969).
- Gandhi, Indira, "Poverty Greatest Pollution, says Mrs Gandhi", *Times of India*, 8 September, 1981.
- Glenn, Seaborg, "Science, Technology and Development: A New World Outlook", USIS, New Delhi.
- Hacoley, Amos H., *Human Ecology* (New York, 1950).
- "India must develop own ecology", *Times of India*, 8 October, 1981.
- Marion, Jerry B., *Energy in Perspective* (London, 1974).
- Misra, K.C., *Manual of Plant Ecology*, New Delhi, 1980.
- Mukherji, P.K., *Life of Tagore*, trans. by S.K. Ghosh, 1975.
- Mumford, Lewis, "The Future of Cities", in *Basic Issues in Environment*, E.J. Winn, ed., 1972.
- Palmslierna, H., *Future Imperatives for Human Environment*, 1972.
- Pavithran, A.K., "World Futurology", *Eastern Journal of International Law* (Madras), vol. 9.
- "Plans to usher India into 21st Century", *Times of India*, 24 October, 1985.
- Polunin, Nicholas, "The Biosphere Today", *The Environmental Future*, Proceedings of 1st International Conference on Environmental Future in Finland, ed. by N. Polunin, 1972.
- Radhakrishnan, S., *Recovery of Faith*, 1967.
- Report on the State of Environment* Prepared by Centre for Science and Environment, New Delhi, 1985.
- Sarkar, Mahendra Nath, *The Cultural Heritage of India*, vol. 1.
- Sen, Sudhir, "Blueprint for a better World", *Times of India*, 2 March, 1980.
- The Limits to Growth*, a report to Club of Rome (New York, 1972).
- The Mind of J. Krishnamurti*, ed. by L.S.R. Vas (Bombay, 1971).
- Toynbee, Arnold, "Man and his Soul", *Hindustan Times*, 4 January, 1968.
- United Nations List of National Parks and Protected Areas*, 1985.
- Vivekananda, Swami, *Complete Works*, vol II (Calcutta, 1968).
- Ward, Barbara and Dubos Rene, *Only one Earth: The Care and maintenance of a small planet*, Report to UN Conference on human environment, Stockholm, 1972.
- "Wildlife laws in India", *Times of India*, 4 March, 1985.
- Ward, Barbara, *Progress for a Small Planet*, 1979.





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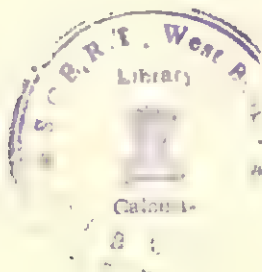
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